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25X

IMAGERY
ANALYSIS
DIVISION

PIR

PHOTOGRAPHIC INTELLIGENCE REPORT

A STUDY OF THE NORTH VIETNAMESE RAIL LINE [redacted]

SOUTH OF HANOI

CIA/PIR 65108

DATE APRIL 1966

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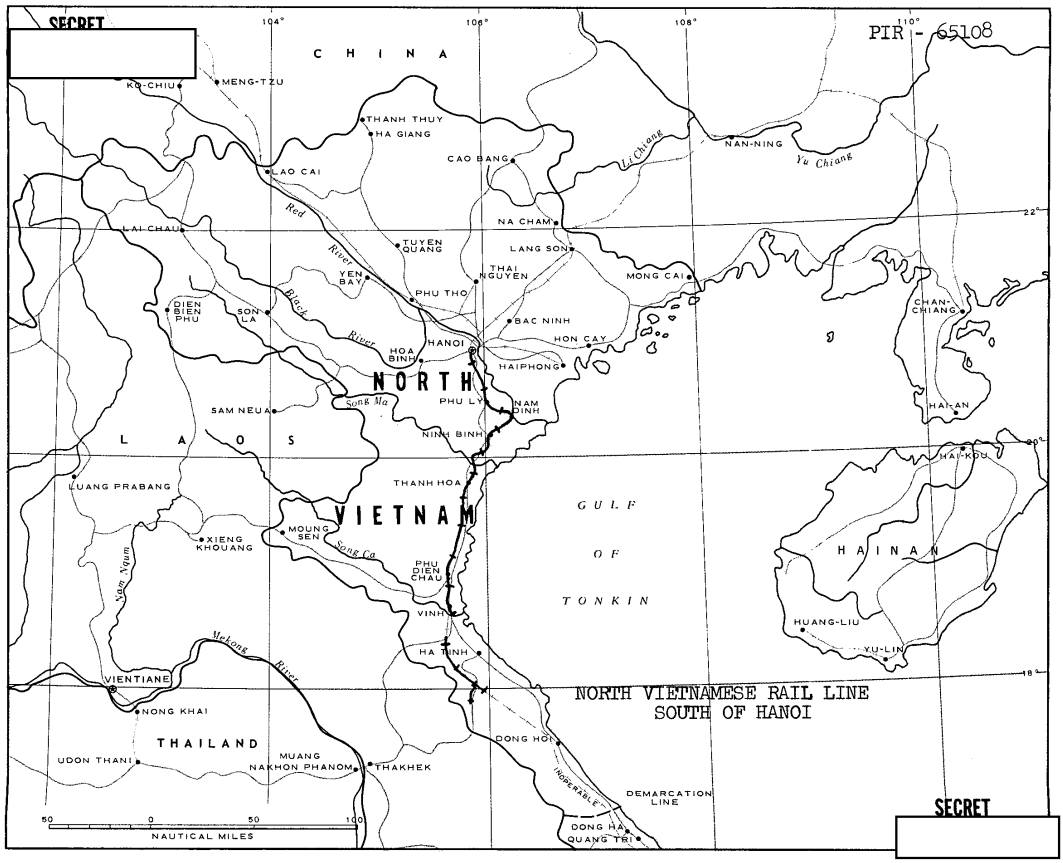

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A STUDY OF THE NORTH VIETNAMESE RAIL LINE SOUTH OF HANOI

The purpose of this study is to analyze the significance of the North Vietnamese rail line south of Hanoi describing certain characteristics which will be helpful in determining its overall capability, and to assess the effects of US airstrikes. This report is also intended as a basic study which may be updated by later reports and by the CIA/IAD North Vietnamese Bomb Damage Assessment program ("BDA").* All major bridges have been keyed to the BDA program which may be referenced in the event of new and significant changes in bridge status.

This study suffers to a small extent from a lack of recent low level photo coverage of the northern portion of the rail line. However, there have been few recent significant airstrikes on the rail line reported in this area so the lack of coverage should not be of too great a consequence.

The importance which the North Vietnamese attach to this rail line is shown by their continuing reconstruction of damaged bridges, repair of interdicted points, and construction of by-pass bridges before the original bridges have been damaged by US airstrikes.

One important conclusion of this study was that the North Vietnamese continued to use the rail line thoroughout 1965 and the spring of 1966 despite frequent interdictions by US airstrikes. This was accomplished by the use of ferries and porters to transfer material around interdicted points.

An attempt was made to determine the capacities of three of the reconstructed wooden bridges, using the method of computing the maximum safe loading of timber stringer bridges as shown in the FORESTRY HANDBOOK, Ronald Press, 1961. It should be realized that capacities given are only approximations and should be treated as such. Where no capacity is given for an undamaged bridge it is assumed to be the standard 12 short tons per axle given for North Vietnamese steel and concrete bridges in NIS 43C section 31, North Vietnam, Railway.

A traffic count on the rail line was not undertaken in this study due to a lack of current coverage of large segments of the rail line in a

* This requirement calls for an assessment of bomb damaged rail and road bridges in North Vietnam and Laos as well as the reconstruction of damaged bridges as observed on photography. Photographic Intelligence Briefs (PIB) are published on a continuing basis as each aerial mission is analyzed.

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relatively short time span.

Information concerning bridge interdictions within this report is not necessarily current. The "BDA" Photo Intelligence Briefs ("PIBs") published by CIA/IAD may be referred to for this information. The major criteria used in determining the major bridges as distinguished from the minor bridges were how difficult would it be to replace the bridge if it were destroyed and how much time and material would be involved. The major bridges are generally over 90 feet overall length. Bridges smaller than this were not considered as major bridges because aerial photography has shown that these can be repaired or replaced in a very short length of time, ranging from a matter of days to two or three weeks.

This rail study has been broken into three parts for ease of handling. The three parts are respectively; Hanoi-Thanh Hoa segment, Thanh Hoa-Vinh segment and Duc Tho-Thanh Lang Xa segment.

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HANOI-THANH HOA SEGMENT

Mileage - 94 nm (108 sm)

Gauge - 1 meter (3'3 1/8")

Maximum Grade - 1.1% (Ref. NIS 43C, Section 31)

Rail weight - 50-61 lb./yd. (Ref. NIS 43C, Section 31). (Shipments of rail from the north have been observed and these may be heavier rails.)

X1 Minimum Radius of Curvature - [redacted] (Ref. NIS 43C, Section 31)

The following map (Figure 1) shows the general alignment, location of bridges, sidings, yards and spurs. Figures 2 through 13 show the major bridges and the text accompanying each figure describes any significant details.

Figures 14 and 15 show the details of the Nam Dinh and Thanh Hoa rail yards. The yard diagrams do not necessarily reflect the current status of the yards. However, if necessary, the yards can be restored to the condition shown in the diagrams within a few weeks, after being damaged by airstrikes.

The Nam Dinh Yard has a total useable track length of approximately 8400 feet. The controlling length of the turning wye is 200'.

The Thanh Hoa rail yard has a total useable track length of 8500 feet in the main yard. The controlling length of the turning wye is 200'.

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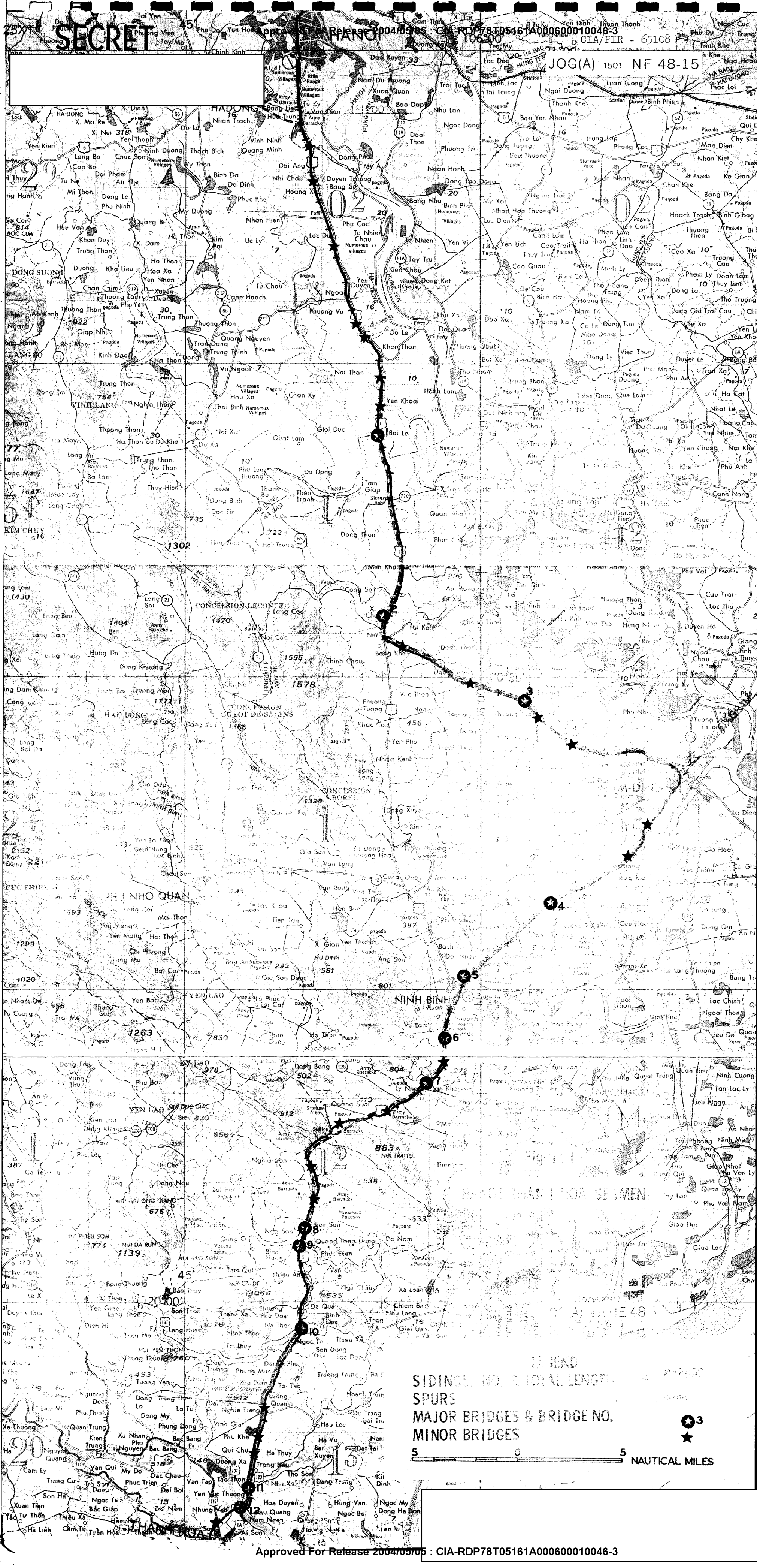

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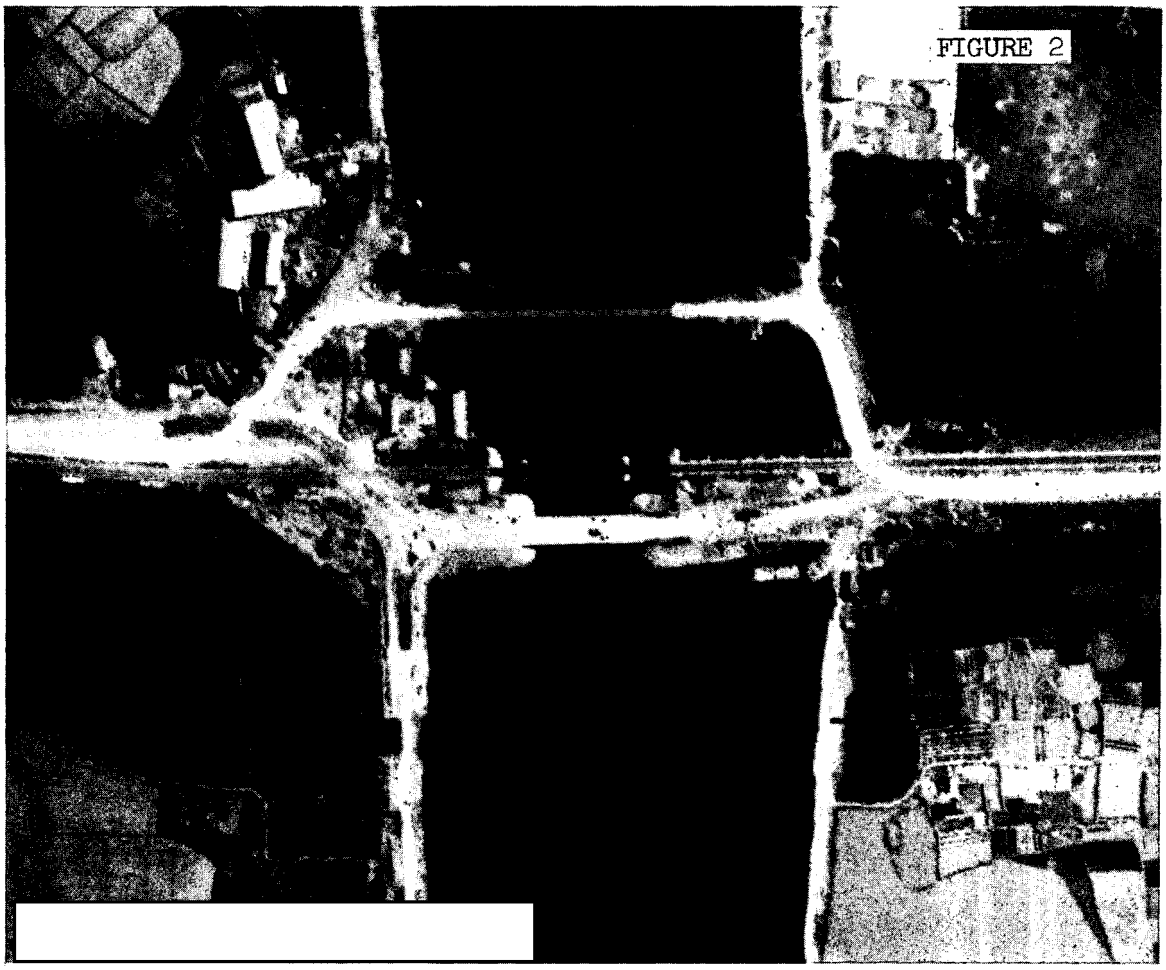

X1

Bridge Number 1 - Co Trai RR Bridge over canal

X1 [redacted] CIA/IAD/BDA Bridge Number 10 on NF 48-15)

This 3-span, steel, half-through truss and deck-girder bridge is approximately 160' long.

This bridge has not been bombed.

[redacted]

25X

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[redacted]

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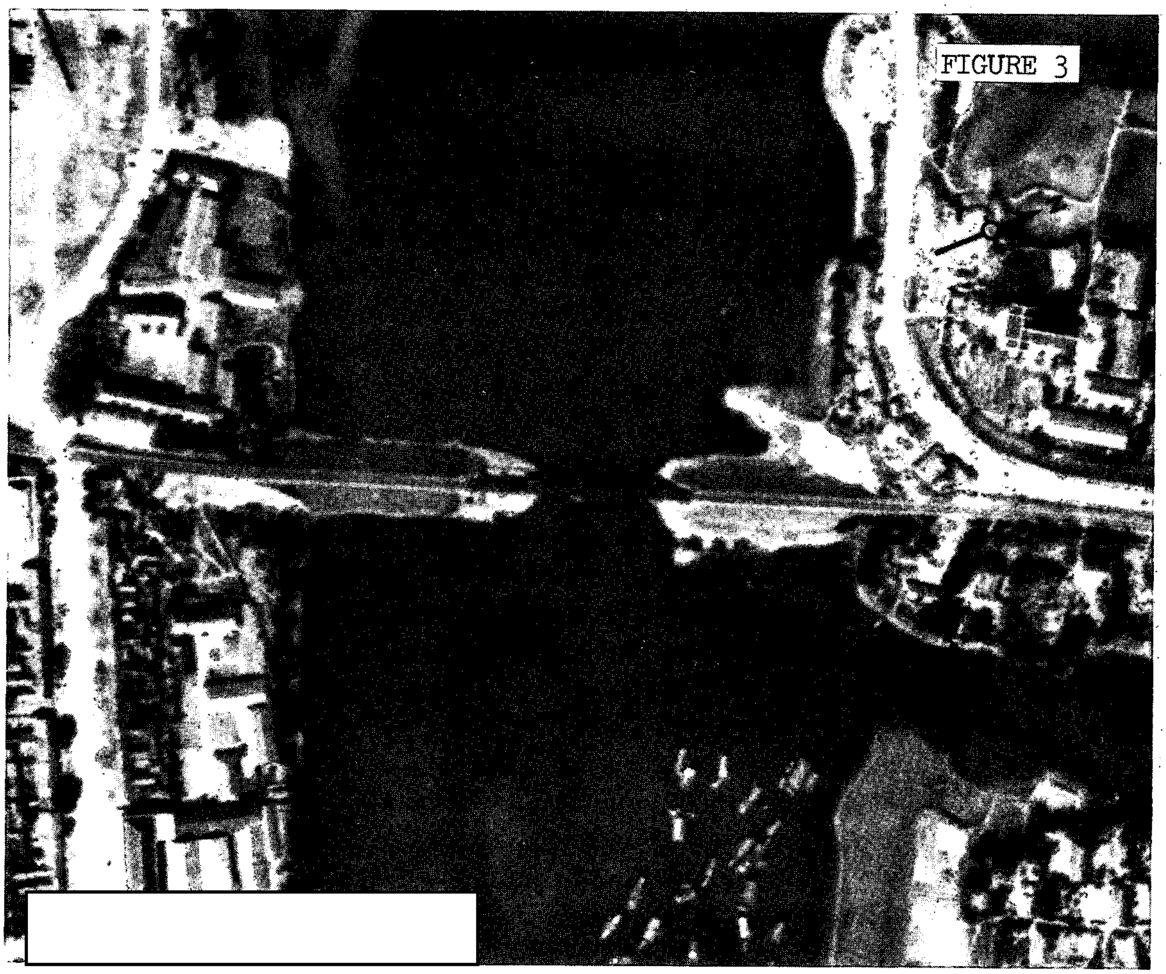


25X1 [redacted]

Bridge Number 2 - Phu Ly RR Bridge over Song Lap

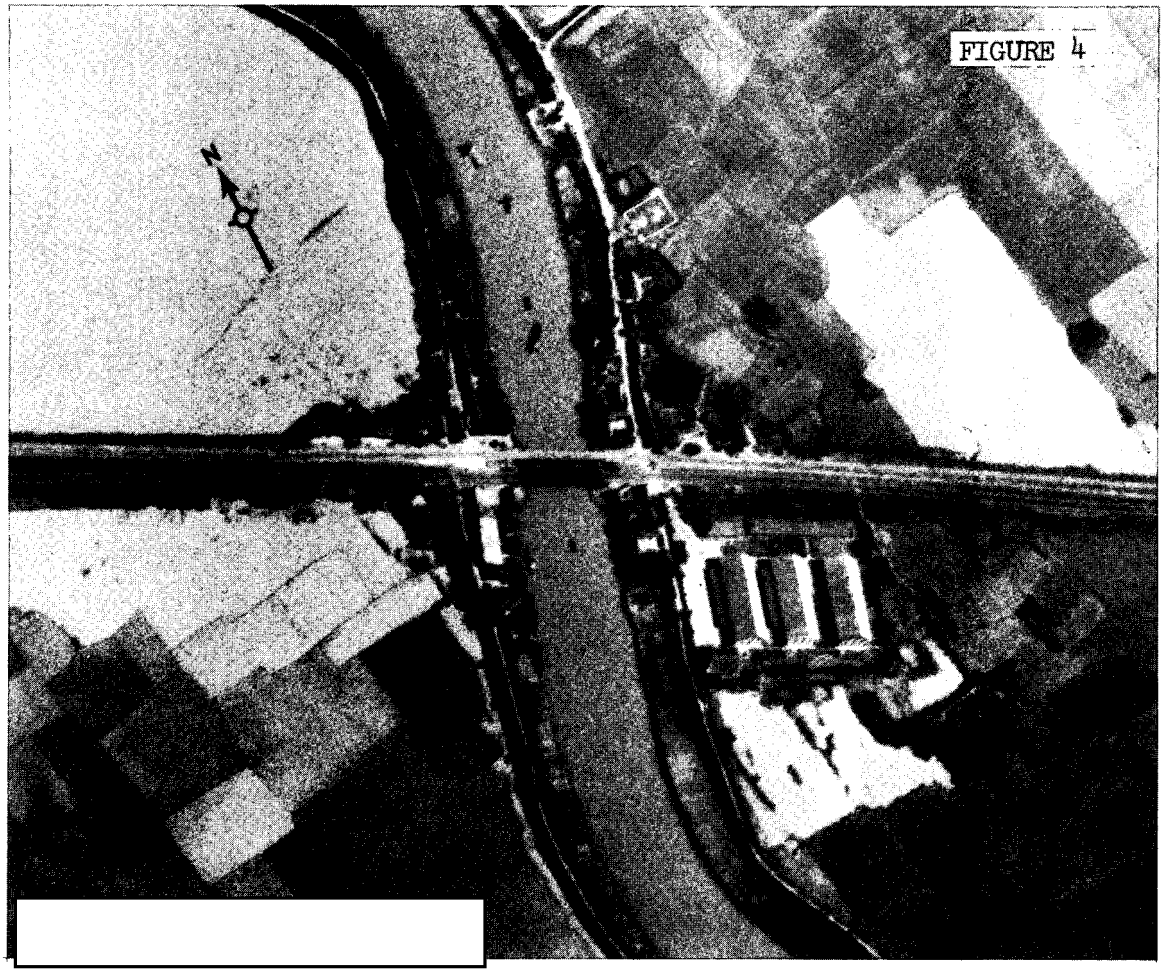
25X1 [redacted] (CIA/IAD/BDA Bridge Number 9 on NF 48-15)

This 4-span, steel, deck-beam bridge is approximately 230' long. The two main spans are approximately [redacted] each and the smaller two spans are approximately [redacted] in length. One of the main spans is possibly a swing span to allow for passage of water craft on the canal. The Phu Ly bridge was bombed by US aircraft in early [redacted] resulting in two spans being destroyed. The present status of this bridge is unknown. The volume of rail traffic movements south of the bridge, however, indicates either a ferry or a reconstructed bridge is being used.

25X1

[redacted]

25X1



Bridge Number 3 - Cao Duong RR Bridge over canal

(CIA/IAD/BDA Bridge Number 11 on NF 48-15)

This probable 2-span, steel, half-through truss bridge is approximately 125' long. Each span is approximately in length. Available photography indicates that this bridge has not been bombed. 25X

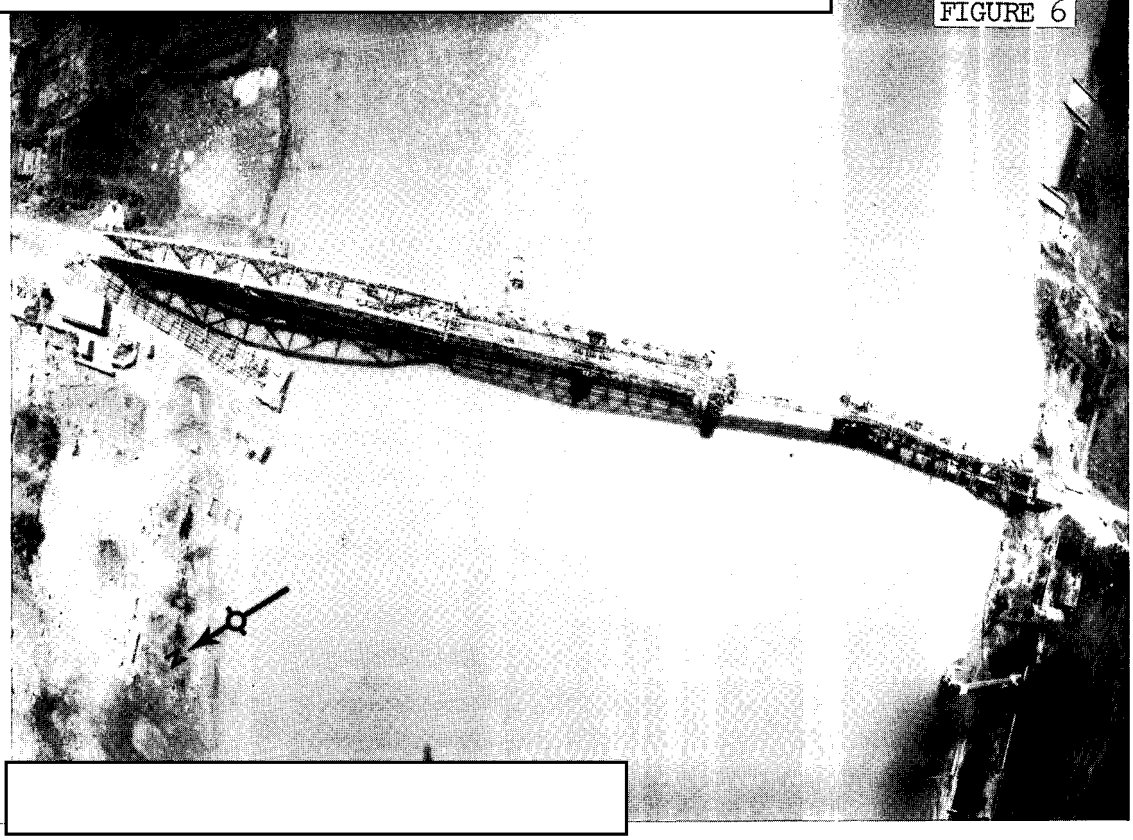
X1

Bridge Number 4 - Ninh Xa RR Bridge over stream

X1 (CIA/IAD/BDA Bridge Number 12 on NF 48-15)

This probable 2-span, steel, half-through truss bridge is approximately 110' long. Each span has a length of approximately 55'. This bridge has not been bombed.

FIGURE 6



Bridge Number 5 - Ninh Binh RR and Hwy. Bridge over Song Day

(CIA/IAD/BDA Bridge Number 1 on NF 48-15)

This bridge before being damaged by US airstrikes was a 3-span, steel, through-arch truss and half-through truss bridge with an overall length of approximately 680'. The two end spans were steel through-arch truss approximately 260' in length. The center span was a probable steel, half-through truss, swing span for the passage of water craft. The current status of this bridge has not been determined due to lack of photography. Rail traffic south of this bridge indicates there is a method of crossing the river.

[redacted]

Bridge Number 6 - Ha Thon RR Bridge over Song Vac

[redacted] (CIA/IAD/BDA Bridge Number 13 on NF 48-15)

This is a 150', single span, steel, through-truss bridge. It has not been bombed.

X1

Bridge Number 7 - Ly Nhan RR Bridge over stream

X1 (CIA/IAD/BDA Bridge Number 14 on NF 48-15)

This is a 95', single span, steel, half-through truss bridge. It has not been bombed.

[redacted]

25X

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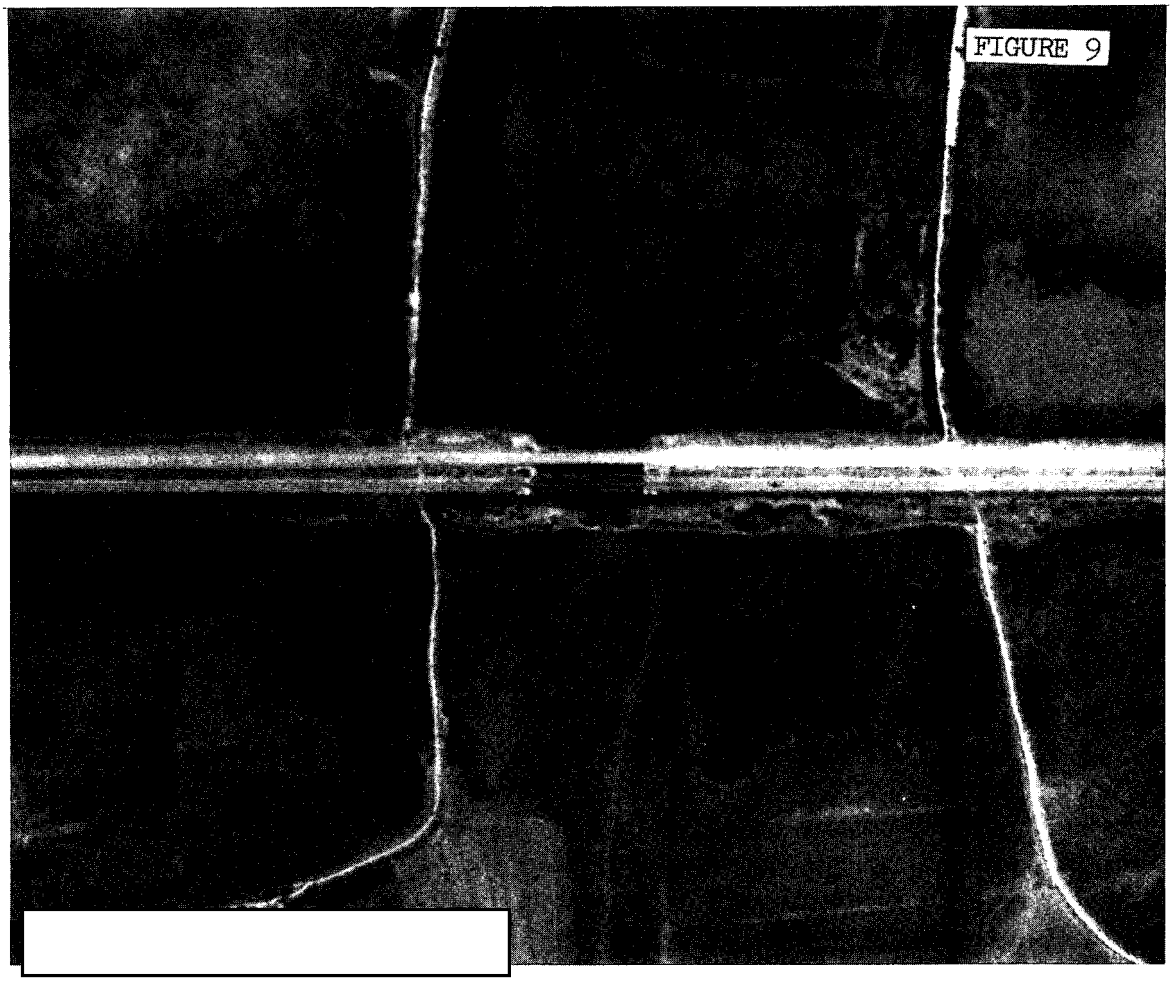


[redacted]

X1

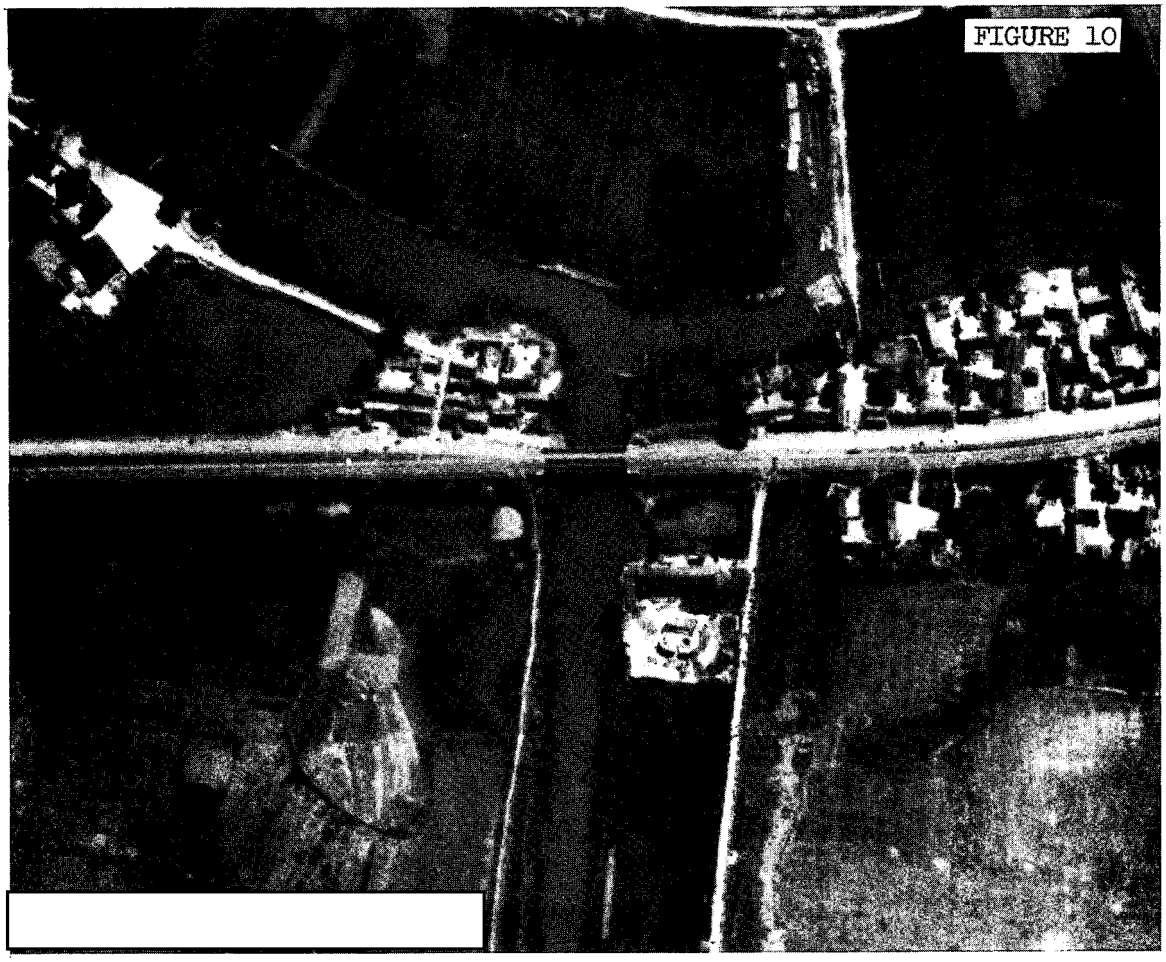
Bridge Number 8 - Bien Son RR Bridge over stream

X1 [redacted] CIA/IAD/BDA Bridge Number 15 on NF 48-15)

This is a 120', steel, through-truss, single span bridge with probable concrete abutments. This bridge has not been bombed.

[redacted]

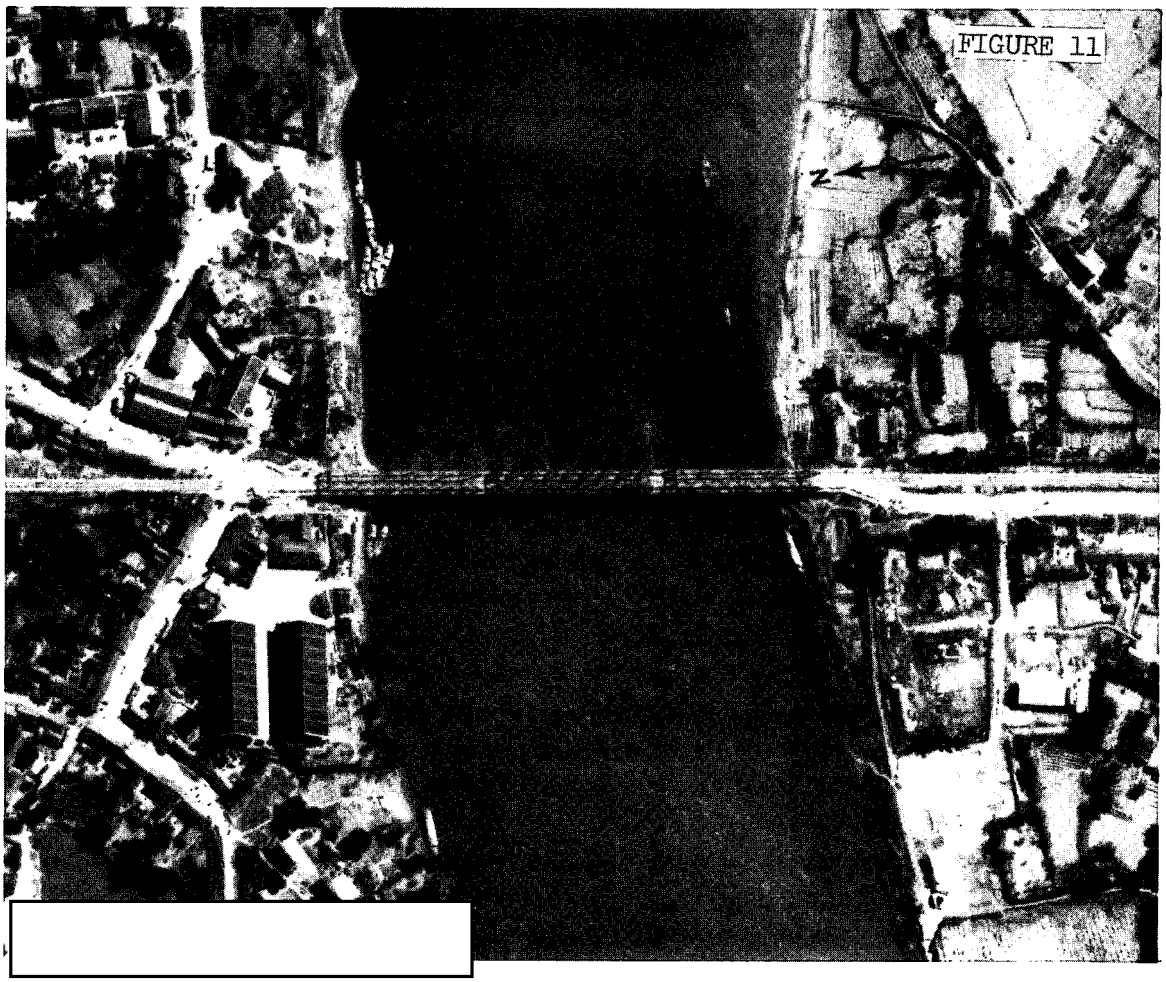
25X



Bridge Number 9 - Yen Xa RR and Hwy. Bridge over stream

(CIA/IAD/BDA Bridge Number 16 on NF 48-15)

This is a 90', single span, steel, half-through truss bridge. It has not been bombed.



X1

Bridge Number 10 - Dong Phong Thuong RR and Hwy. Bridge over Song Lan

X1 (CIA/IAD/BDA Bridge Number 6 on NE 48-3)

This combination rail and highway bridge was a 450', three span, steel, through-truss structure. Each span had a length of approximately 150'. The three piers are probably concrete. US airstrikes in the fall of 1965 destroyed all three spans, leaving the piers and abutments intact. Since then two by-pass rail bridge have been constructed around the interdicted bridge. These by-pass bridges are probably of the timber trestle type seen further south.

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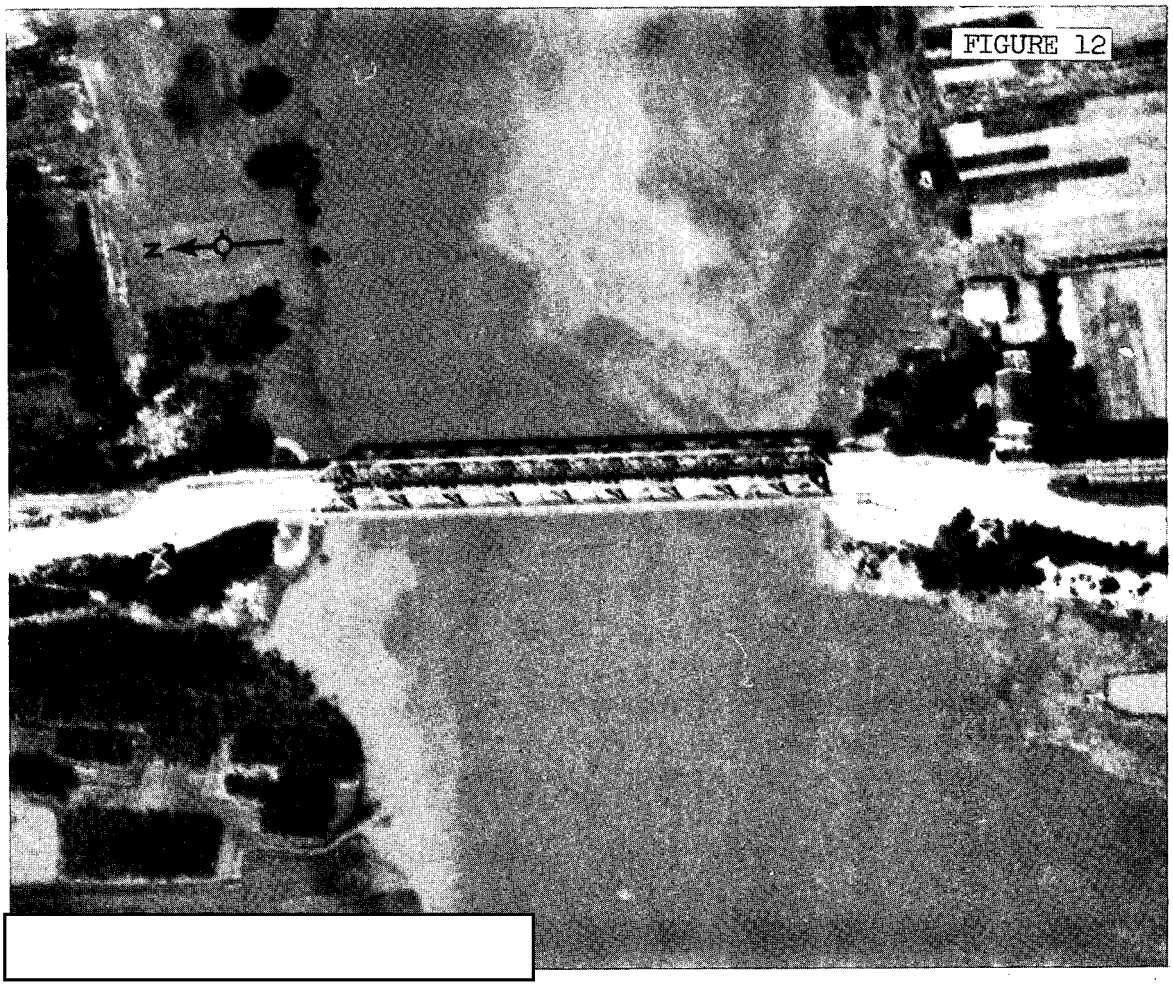

[redacted]

Bridge Number 11 - Phuong Dinh RR and Hwy. Bridge over Lach Truong

[redacted] CIA/IAD/BDA Bridge Number 16 on NE 48-3)

This is a single span, 245', through-truss bridge. The abutments are probably concrete or masonry. This bridge has not been bombed.

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[redacted]

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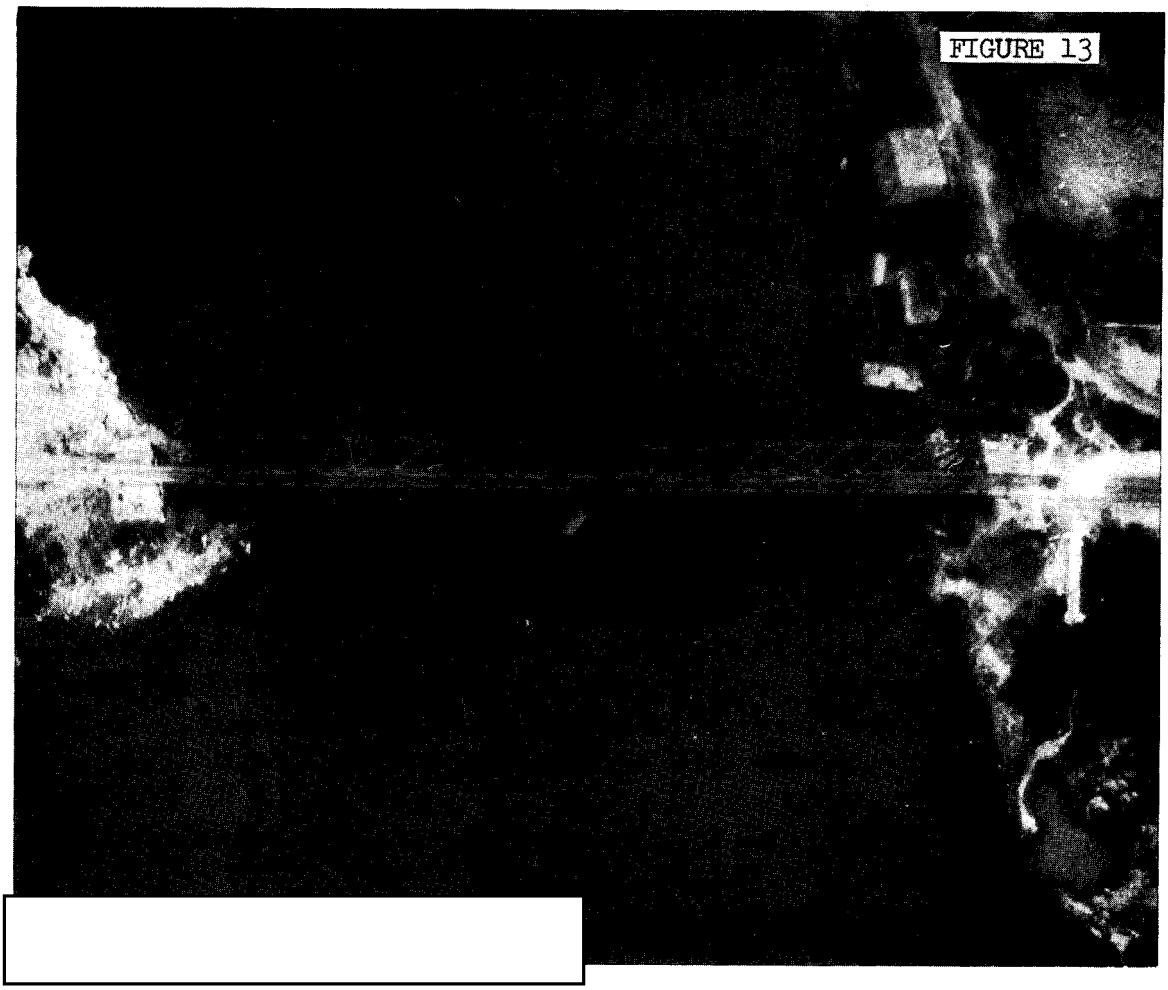
CIA IMAGERY ANALYSIS DIVISION



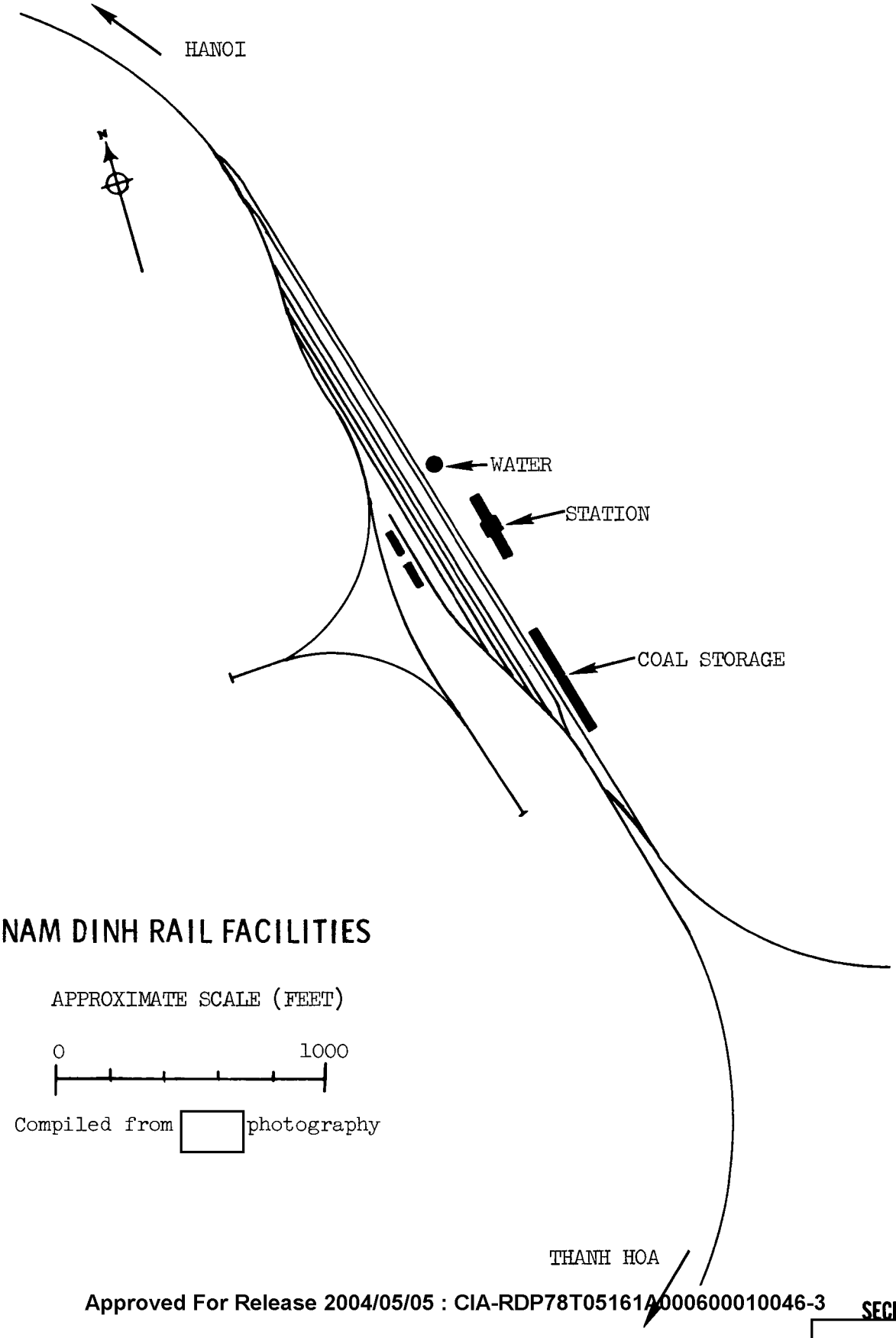
X1 [redacted]

Bridge Number 12 - Thanh Hoa RR and Hwy. Bridge over Song Ma

X1 [redacted] (CIA/IAD/BDA Bridge Number 7 on NE 48-3)

This bridge is a 540', 2-span, continuous steel through truss structure. The pier and the abutments are constructed of concrete. After damage by US airstrikes, the highway portion of the bridge was removed and the light damage to the superstructure was repaired. The bridge now should hold near normal capacity.

X1 [redacted]



NAM DINH RAIL FACILITIES

APPROXIMATE SCALE (FEET)

0 1000

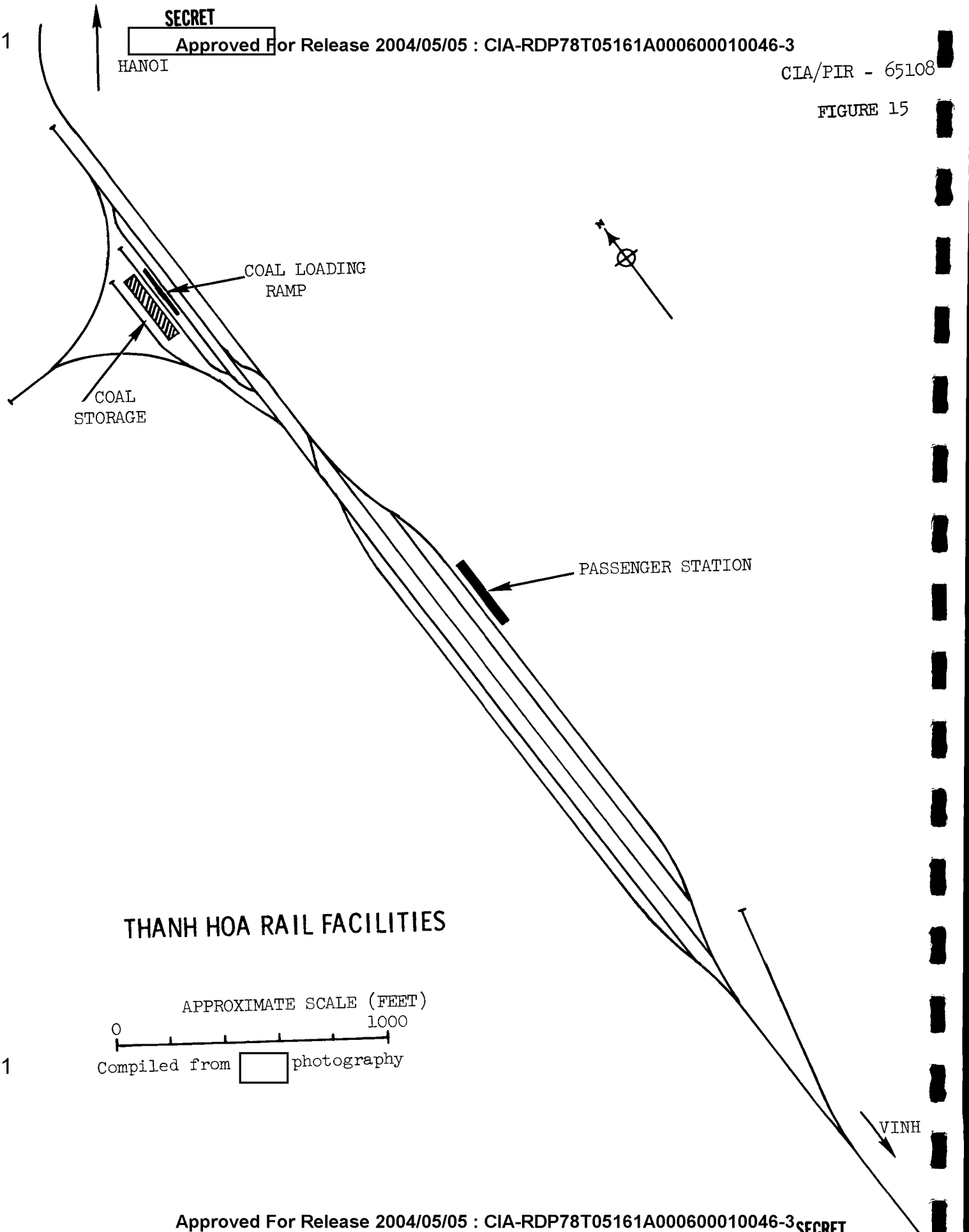
Compiled from [redacted] photography

X1

HANOI

CIA/PIR - 65108

FIGURE 15



THANH HOA RAIL FACILITIES

APPROXIMATE SCALE (FEET)

0 1000

X1 Compiled from [redacted] photography

25X

CIA IMAGERY ANALYSIS DIVISION

THANH HOA - VINH SEGMENT

Mileage - 79 nm (91 sm)

Gauge - 1 m (3'3 3/8")

Maximum grade - Probable 1.1 - 1.3% (Ref. Bureau Commissaire Des C.F.V.N. - Saigon, Ligne de Hanoi a Saigon)

Rail weight - 50-61 lb./yd. (Ref. NIS 43C, Section 31)

Minimum Radius of Curvature - 890' (Ref. Bureau Commissaire Des C.F.V.N. - Saigon, Ligne de Hanoi a Saigon)

The following map (Figure 16) shows the general alignment, location of bridges, sidings yards and spurs. Figures 17 through 29 show the major bridges and the text accompanying each figure describes any significant details about the bridge.

Figure 30 is a perspective drawing of the Tam Da railroad bridge. This drawing was compiled from several aerial photographs. Figure 31 is a diagram of the Vinh rail facilities. This diagram does not necessarily represent the current status of the rail yard; however, if necessary, the yard can be restored to the condition shown in the diagram within a few weeks after an airstrike.

The Vinh yard has a total of approximately 5000' of useable track in the main yard. The turning wye has a controlling length of 220'.

A rail spur extends from Vinh approximately 3.0 nm SE to the Port of Ben Thuy [redacted] 18 38N - 105 42E), (Figure 32). From Ben Thuy, material is probably shipped by water to the northern end of the Duc Tho-Thanh-Lang Xa Rail Line Segment at Duc Tho (18 32N - 105 35E). This shipment by water covers approximately 12 nm between Ben Thuy and Duc Tho via the Song Ca and Song La Giang Rivers.

X1

25X

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JOG(A) 1501 NE 48-3

JOG(A) 1501 NE 48-7

THANH HOA-VINH SEGMENT

FIGURE 16

LEGEND

SIDINGS, NO. & TOTAL LENGTH 2-2000

SPURS

MAJOR BRIDGES & BRIDGE NO. B

MINOR BRIDGES

5 0 5 NAUTICAL MILES

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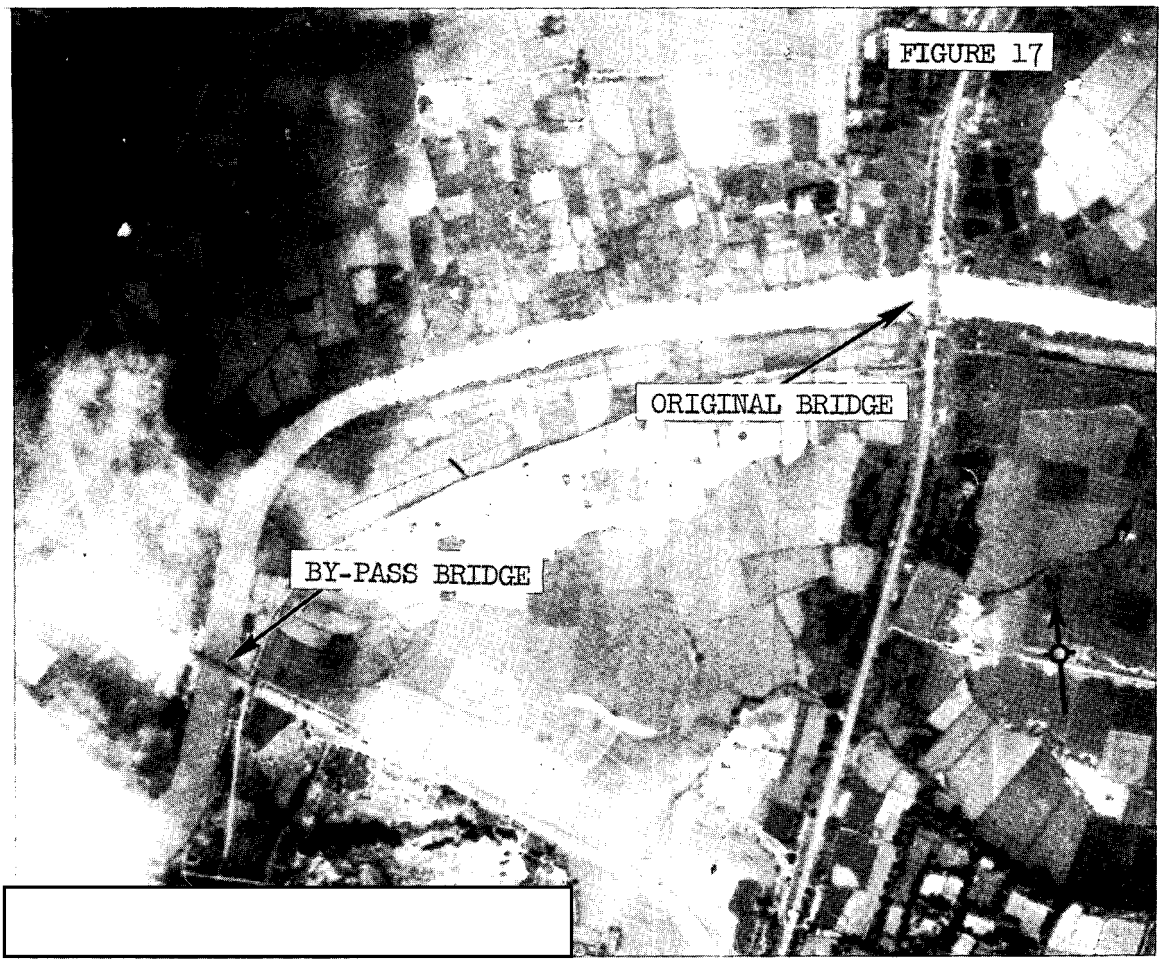

X1

Bridge Number 13 - Thien Linh Dong RR Bridge over Hoang Giang

X1 (CIA/IAD/BDA Bridge Number 33 on NE 48-3)

This 165', two-span, through-plate girder bridge was subject to US airstrikes in early October 1965, resulting in light damage to one span. The damage was repaired and the spans were strengthened by adding another pier under each span. The new piers appear to be of lattice timber construction. In addition to the strengthening of the old bridge, there is a by-pass bridge and rail spur under construction approximately 700 yards to the west of the original bridge.

[redacted] 25X

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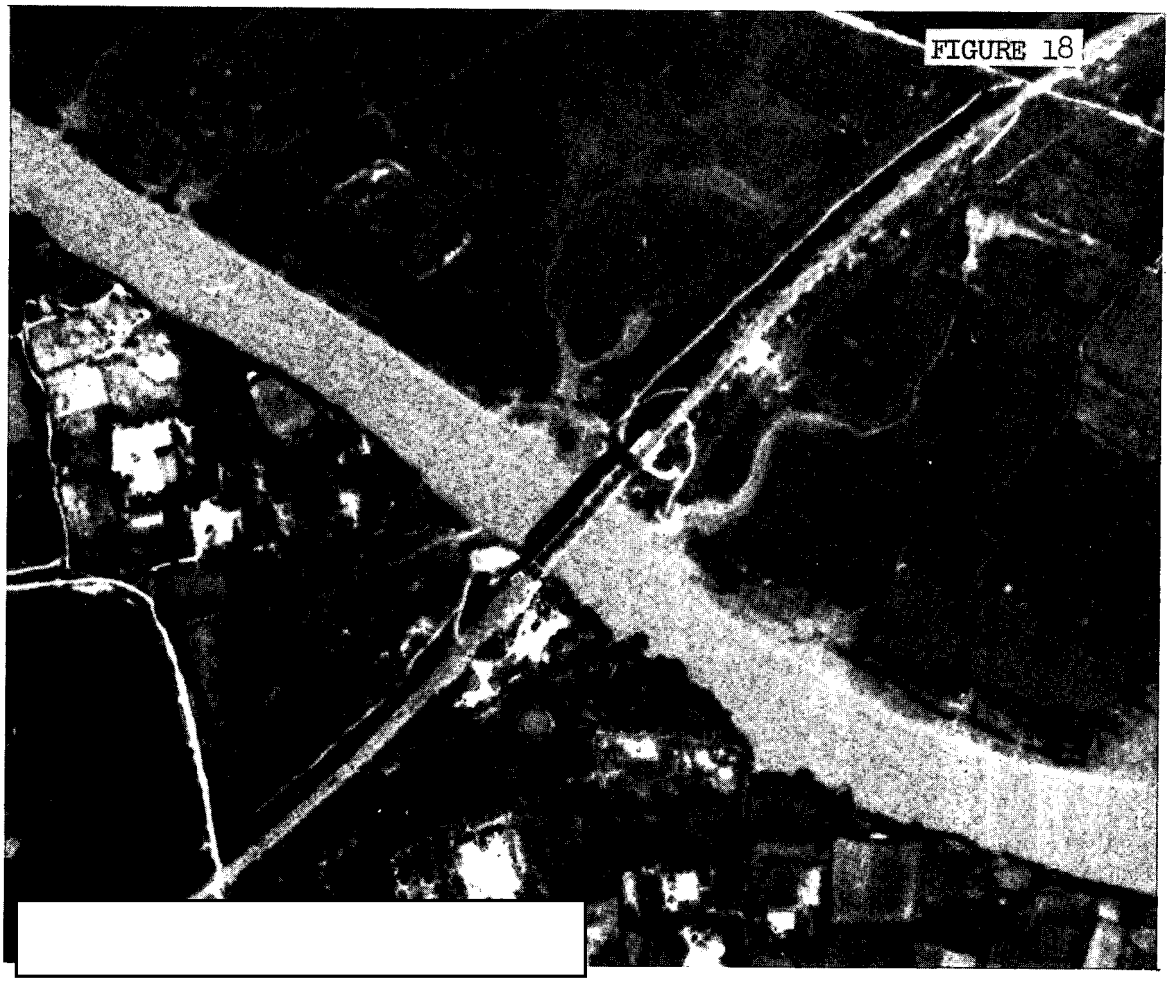


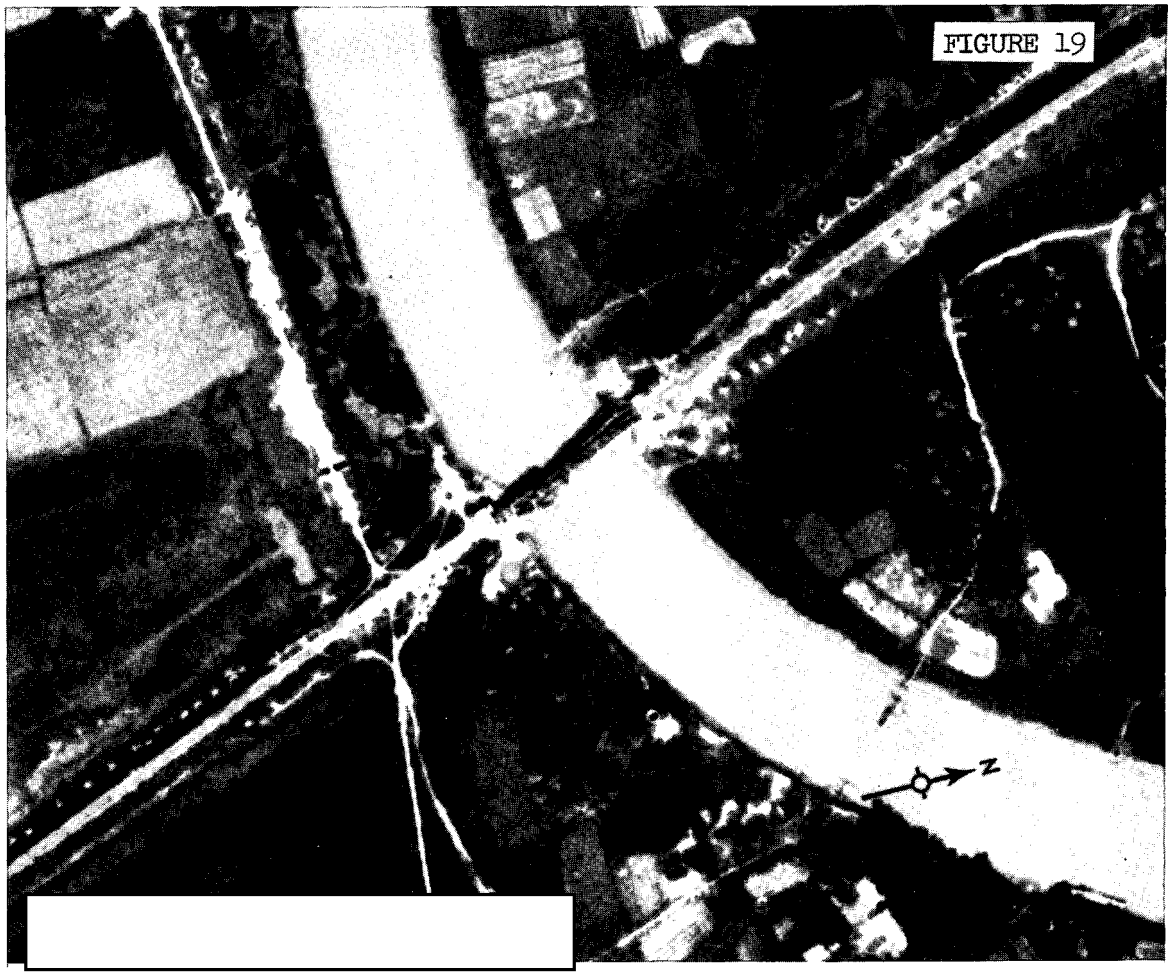
X1 [redacted]

Bridge Number 14 - Thinh Lac RR Bridge over stream

X1 [redacted] (CIA/IAD/BDA Bridge Number 46 on NE 48-3)

This 2-span, steel, continuous through-truss bridge is 150' long. The pier and abutments are probably concrete. This bridge has not been bombed.

[redacted] 25X



[redacted]

Bridge Number 15 - Truong Quang Tien RR Bridge over Song Yen

[redacted] (CIA/IAD/BDA Bridge Number 37 on NE 48-3)

This is a 155', three-span, steel, deck-girder structure. US airstrikes in the late summer of 1965 resulted in one span being dropped, and another span being heavily damaged. [redacted] a rail by-pass bridge and approaches were under construction, but it has been impossible to evaluate further reconstruction efforts due to lack of photography. The volume of rail traffic south of this bridge however, indicates that some method of crossing the river has been accomplished.

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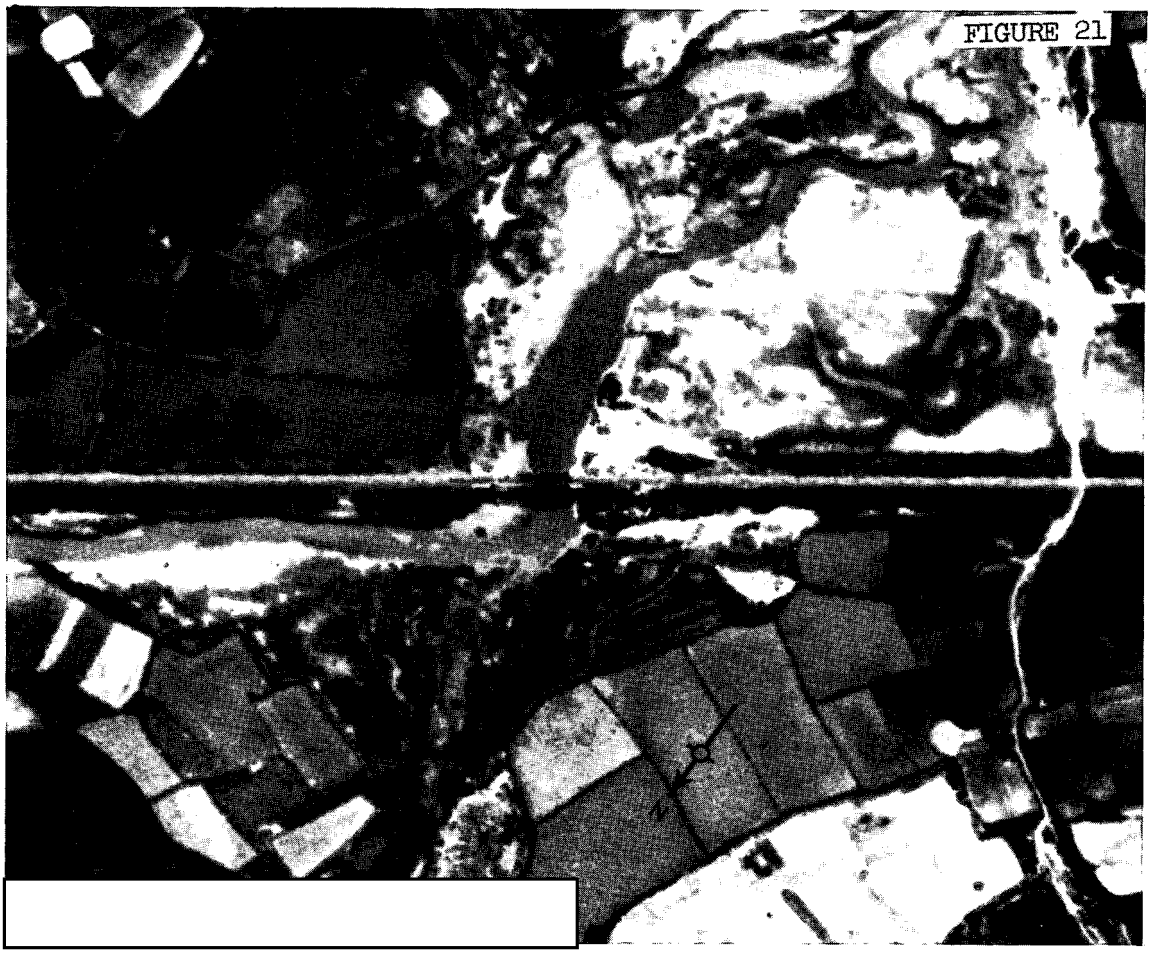
X1

Bridge Number 16 - Thi Long RR Bridge over Suoi Cay Gang

X1 (CIA/IAD/BDA Bridge Number 2 on NE 48-3)

This is a 135', single-span, steel, through-truss bridge. US airstrikes in June 1965 resulted in the approaches being interdicted and slight damage to the superstructure of the bridge. Since that time the approaches have been reinstated and the bridge has been strengthened through the use of a wooden lattice pier under the damaged portion of the bridge superstructure.

25X



X1

Bridge Number 17 - Phu Quat RR Bridge over stream

X1 CIA/IAD/BDA Bridge Number 47 on NE 48-3

This is a 90', single-span, steel, through-truss bridge. The abutments are probably concrete. This bridge has not been bombed.

X1

[redacted] 25X

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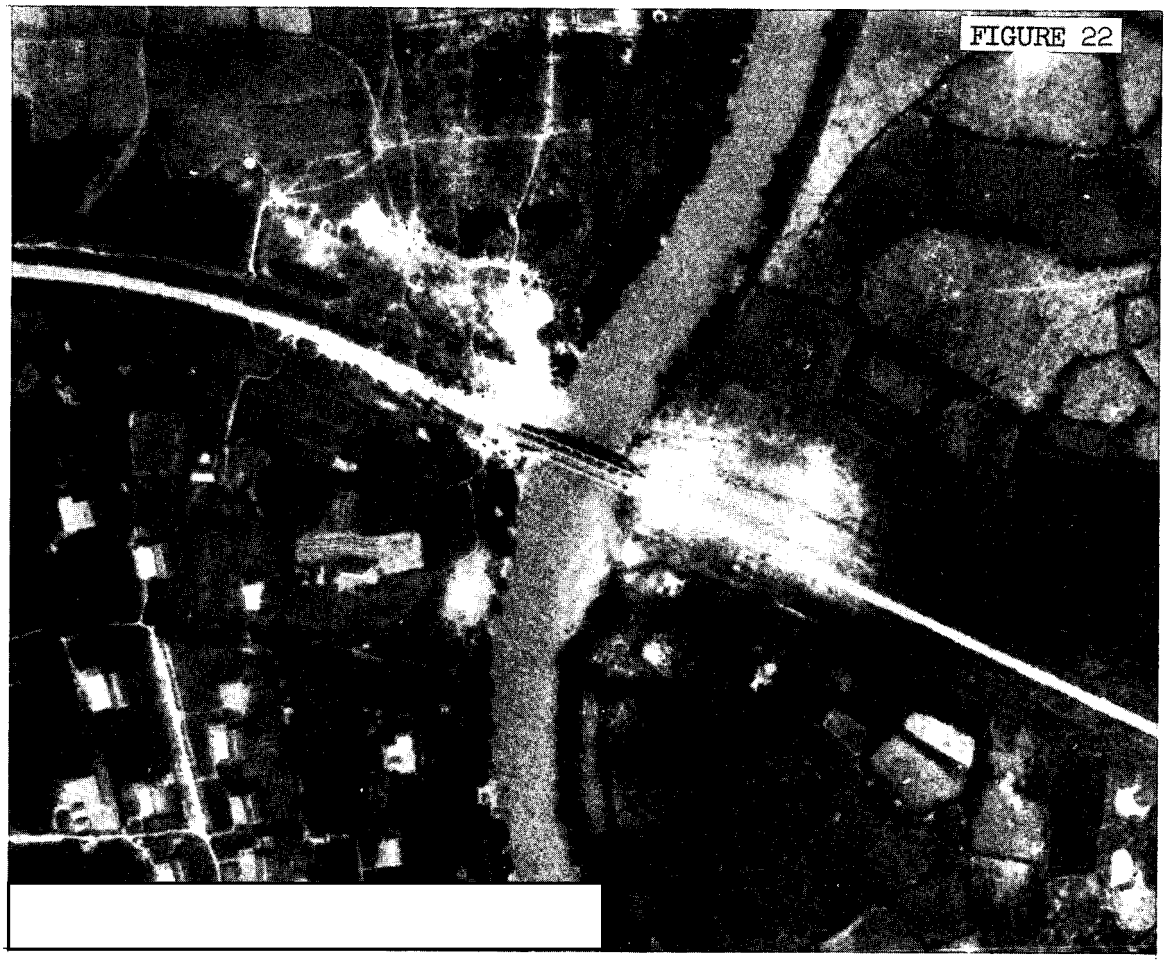

X1 [redacted]

Bridge Number 18 - Dia Thuy RR Bridge SW over stream

X1 [redacted] (CIA/IAD/BDA Bridge Number 17 on NE 48-3)

This is a 130', 2-span, steel, probable half-through truss bridge. A US airstrike damaged the approaches but the bridge remains intact and the damaged approaches have been repaired. A rail by-pass bridge has been constructed near the original bridge and is ready to be used immediately, should the original bridge be interdicted again. The by-pass bridge is constructed of wood and is a deck beam type with wooden lattice towers supporting the superstructure.

[redacted] 25X

[redacted]

25X

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[redacted]

X1

Bridge Number 19 - Qui Vinh RR Bridge over Song Hoang Mai

X1 [redacted] (CIA/IAD/BDA Bridge Number 1 on NE 48-3)

This bridge, originally a 300', 4-span, steel, through-truss structure with concrete piers and abutments, was heavily damaged by US airstrikes and remains unrepaired. Two spans were dropped and one approach was heavily cratered. Since the above photo was taken, two new rail bridges have been constructed in the vicinity of the original bridge. Both of these bridges are of the timber deck-beam type with wooden lattice piers for support. Rail traffic can be almost immediately diverted from one by-pass bridge to the other in the event of another interdiction.

[redacted]

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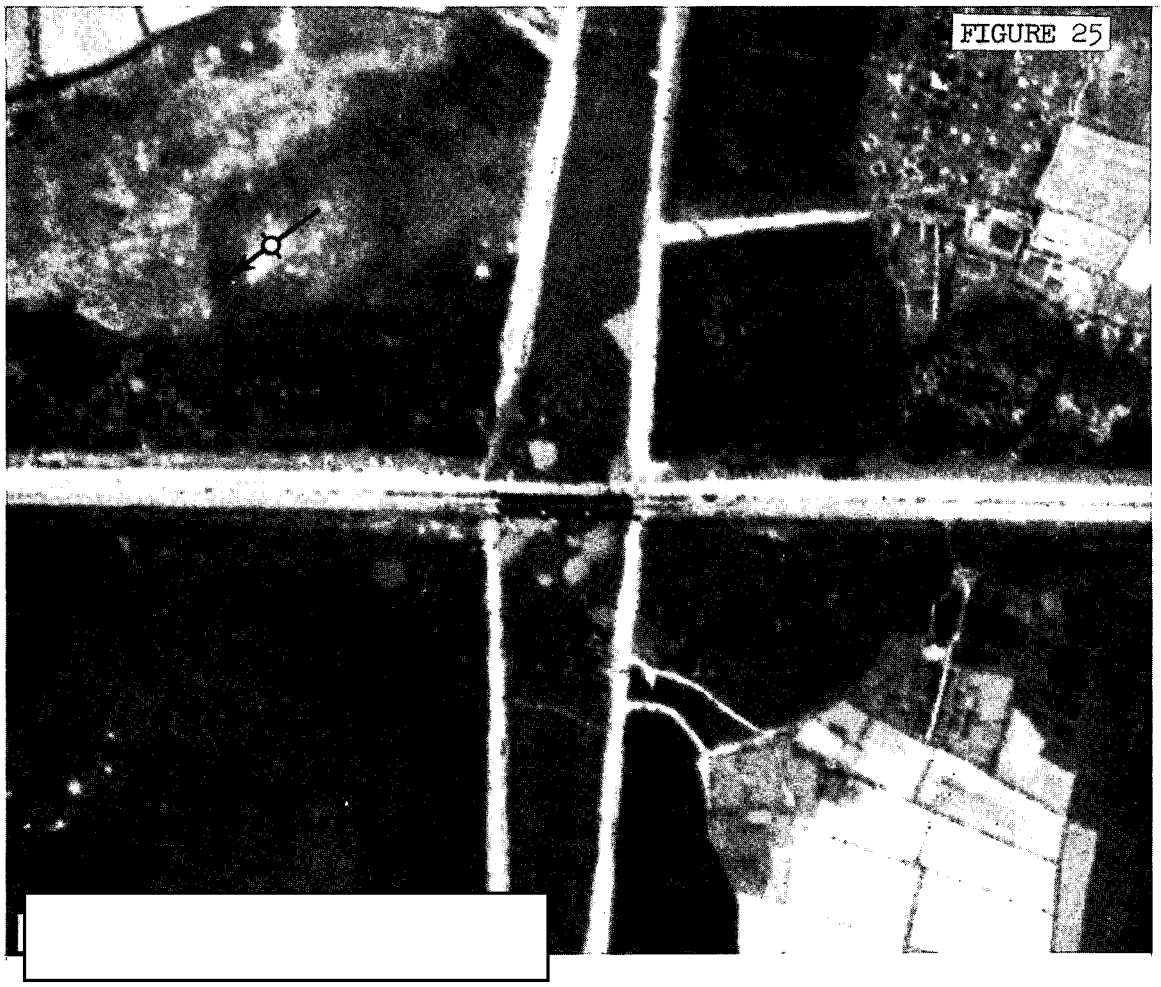
FIGURE 24

X1

Bridge Number 20 - My Hoa RR Bridge over stream

X1 (CIA/IAD/BDA Bridge Number 10 on NE 48-3)

This bridge is a 115', 3-span, steel, deck-girder bridge. The three piers and abutments are probably concrete. Although subject to US air-strikes, the bridge has not been damaged.



Bridge Number 21 - Long Ngoc RR Bridge over unknown Barrier

CIA/IAD/BDA Bridge Number 48 on NE 48-3)

This is an approximately 145', 3-span, steel, deck-girder bridge. The piers and abutments are concrete. This bridge has been subject to US airstrikes but remains undamaged.

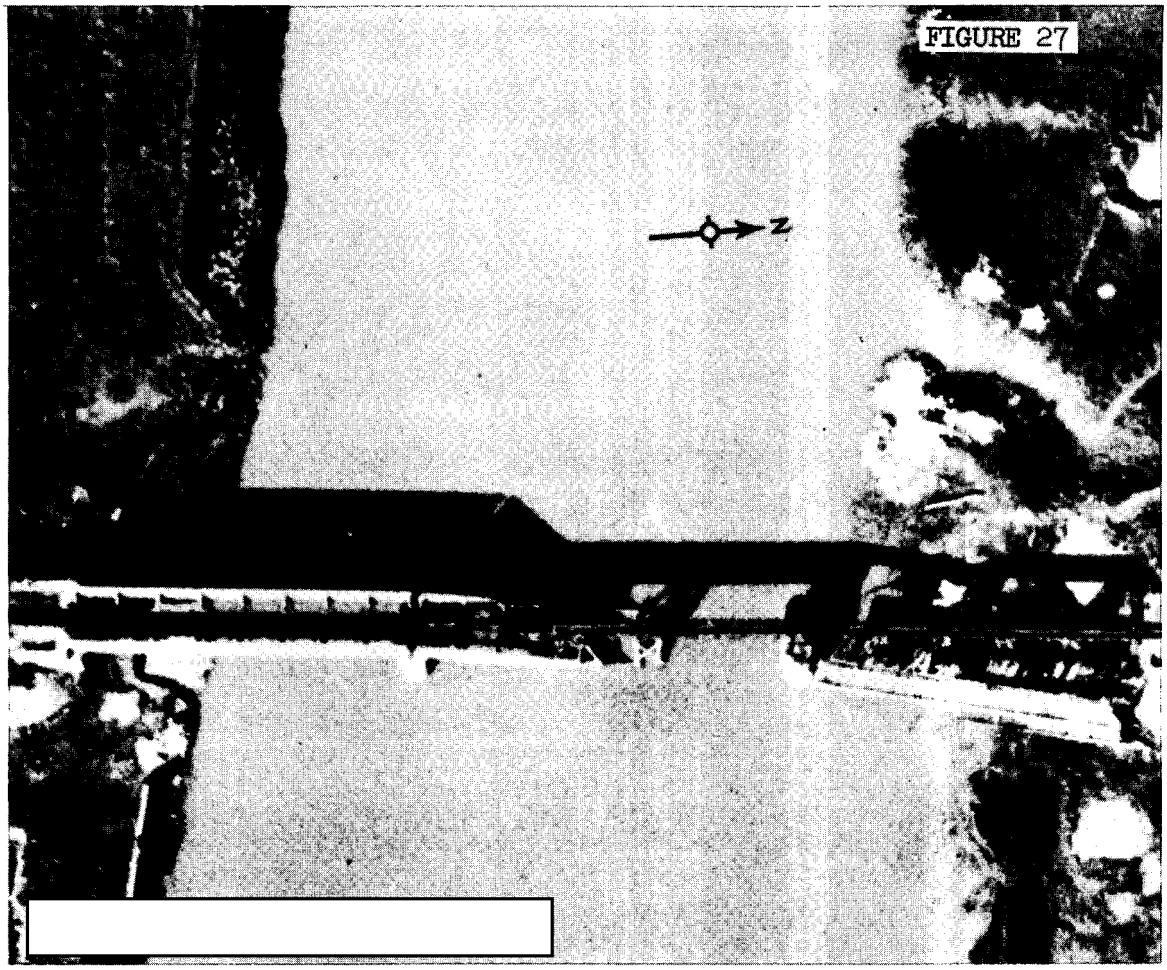
X1 [redacted]

Bridge Number 22 - Dong Khe RR Bridge over stream

X1 [redacted] CIA/IAD/BDA Bridge Number 49 on NE 48-3)

This is an approximately 95', 2-span, steel, probable deck-girder bridge. The pier and abutments are probably concrete. The bridge has not been bombed.

[redacted]



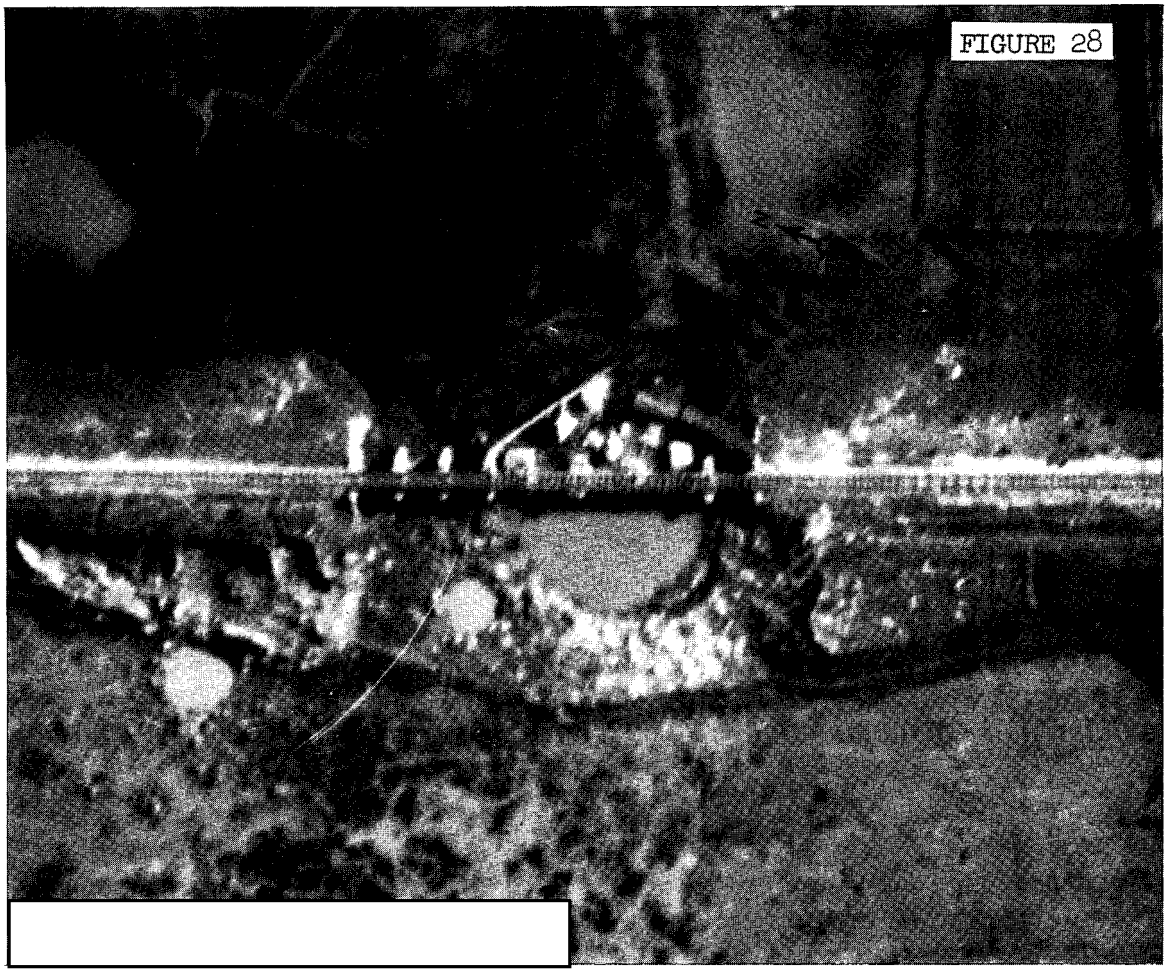
X1

Bridge Number 23 - Dien Chau RR Bridge over Song Bang

X1 (CIA/IAD/BDA Bridge Number 6 on NE 48-7)

This bridge, originally an approximately 350', 3-span, steel, plate-girder structure, had two spans dropped by US airstrikes. Since the airstrikes, the bridge has been repaired by using a timber, deck-beam type construction. One span is possibly an inverted steel truss.

FIGURE 28



X1

Bridge Number 24 - Da Phuc RR Bridge over intermittent waterway

X1 CIA/IAD/BDA Bridge Number 51 on NE 48-7)

This is a 135', 9-span, steel, deck-girder bridge with probable masonry piers. Six spans were dropped, another span badly twisted, and four piers were destroyed by US airstrikes. The bridge has been reconstructed using wooden and masonry piers and probable wood, deck-beam superstructure.

X1

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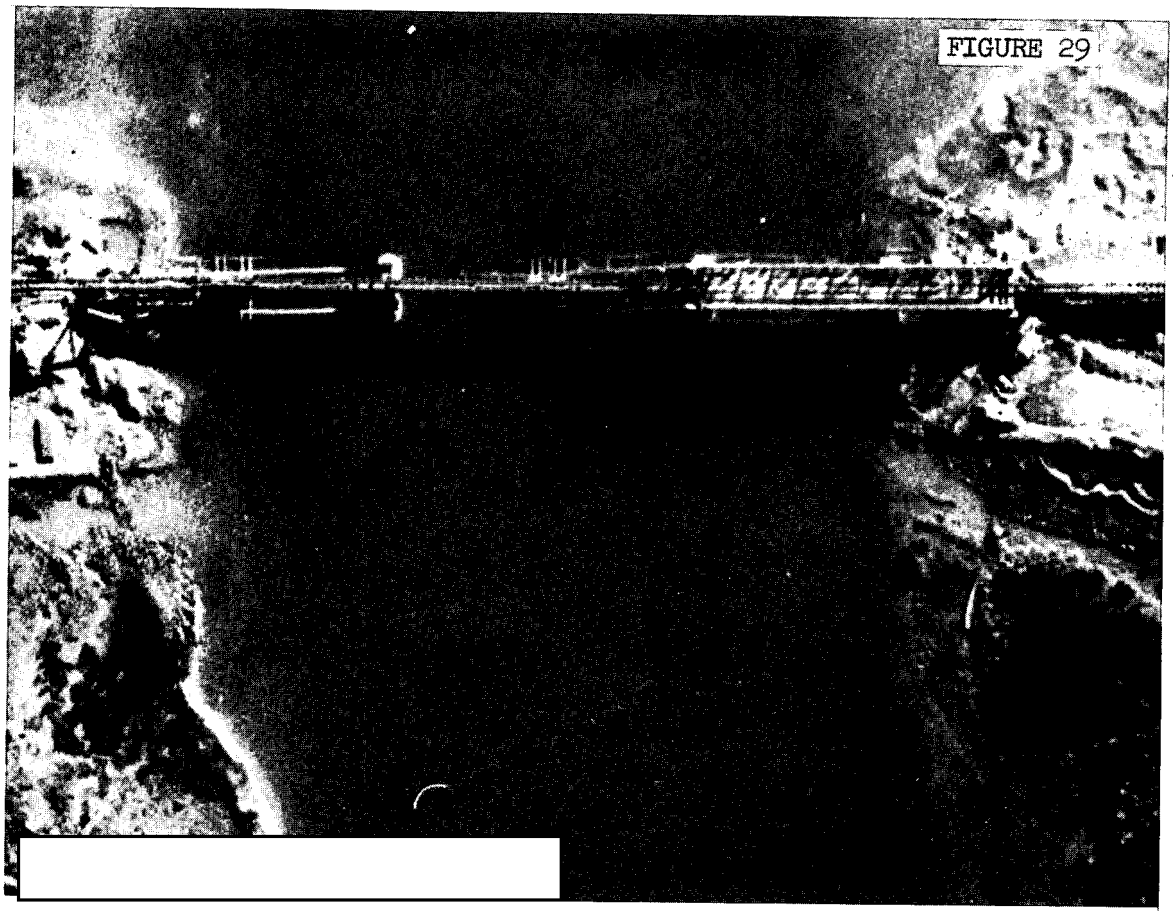

[redacted]

Bridge Number 25 - Tam Da RR Bridge over Song Cua Lo

[redacted] (CIA/IAD/BDA Bridge Number 18 on NE 48-7)

This was originally a 360', 3 span, steel, half-through truss bridge with concrete piers. Two spans were dropped as a result of US airstrikes. The bridge has been repaired with a wood, deck-beam structure supported by wooden lattice towers (See figure 30). The capacity of this bridge is approximately 7 to 10 tons total load per span.

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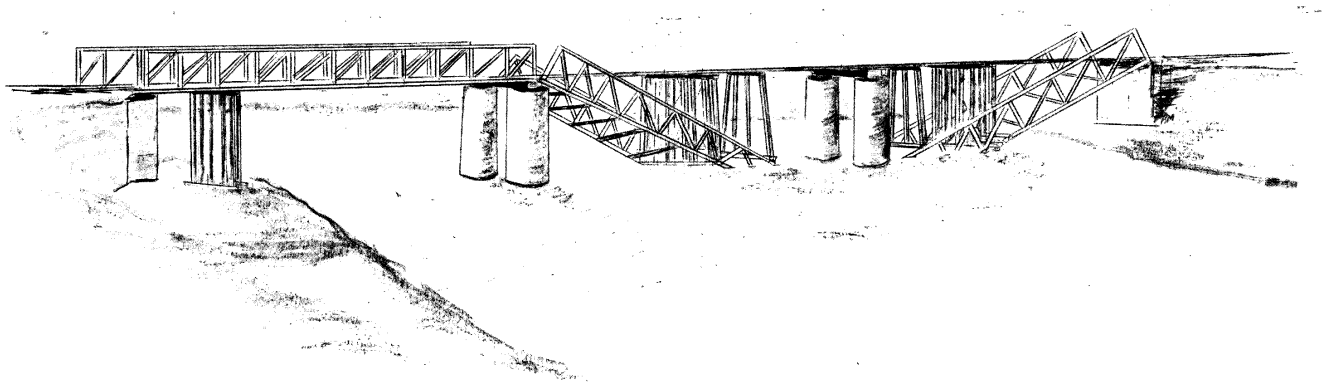
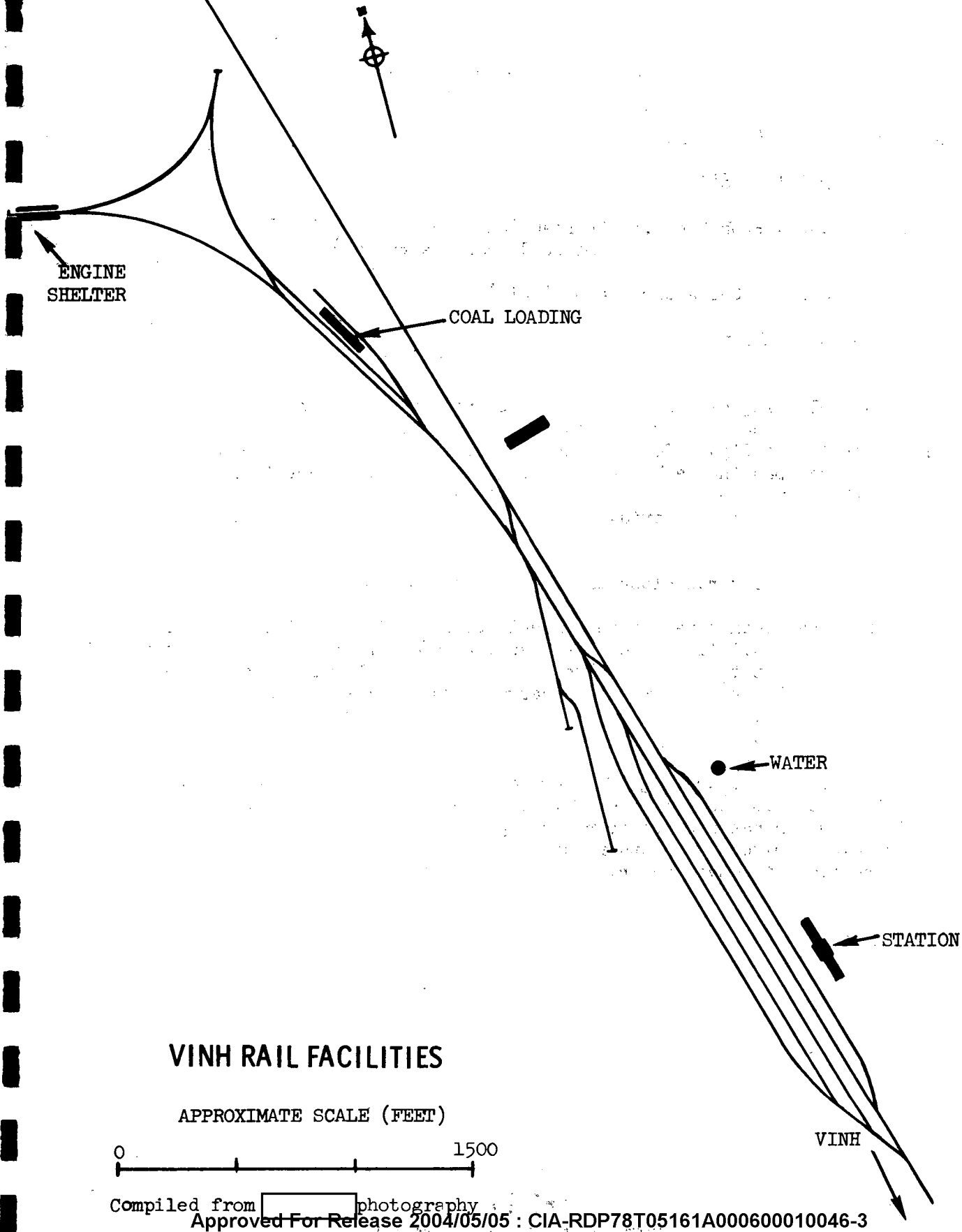
[redacted]

FIGURE 30



TAM DA RR BRIDGE

FIGURE 31



VINH RAIL FACILITIES

APPROXIMATE SCALE (FEET)

0 1500

Compiled from [redacted] photography

[redacted] 25X

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DUC THO - THANH LANG XA SEGMENT

Mileage - 42 nm (47.5 sm)

Gauge - 1 m (3'3 3/8")

Maximum Grade - Probable 1.5% (Bureau Commissaire Des C.F.V.N. - Saigon Ligue de Hanoi a Saigon)

Minimum Radius of Curvature - 490' (Ibid)

Rail Weight - Unknown

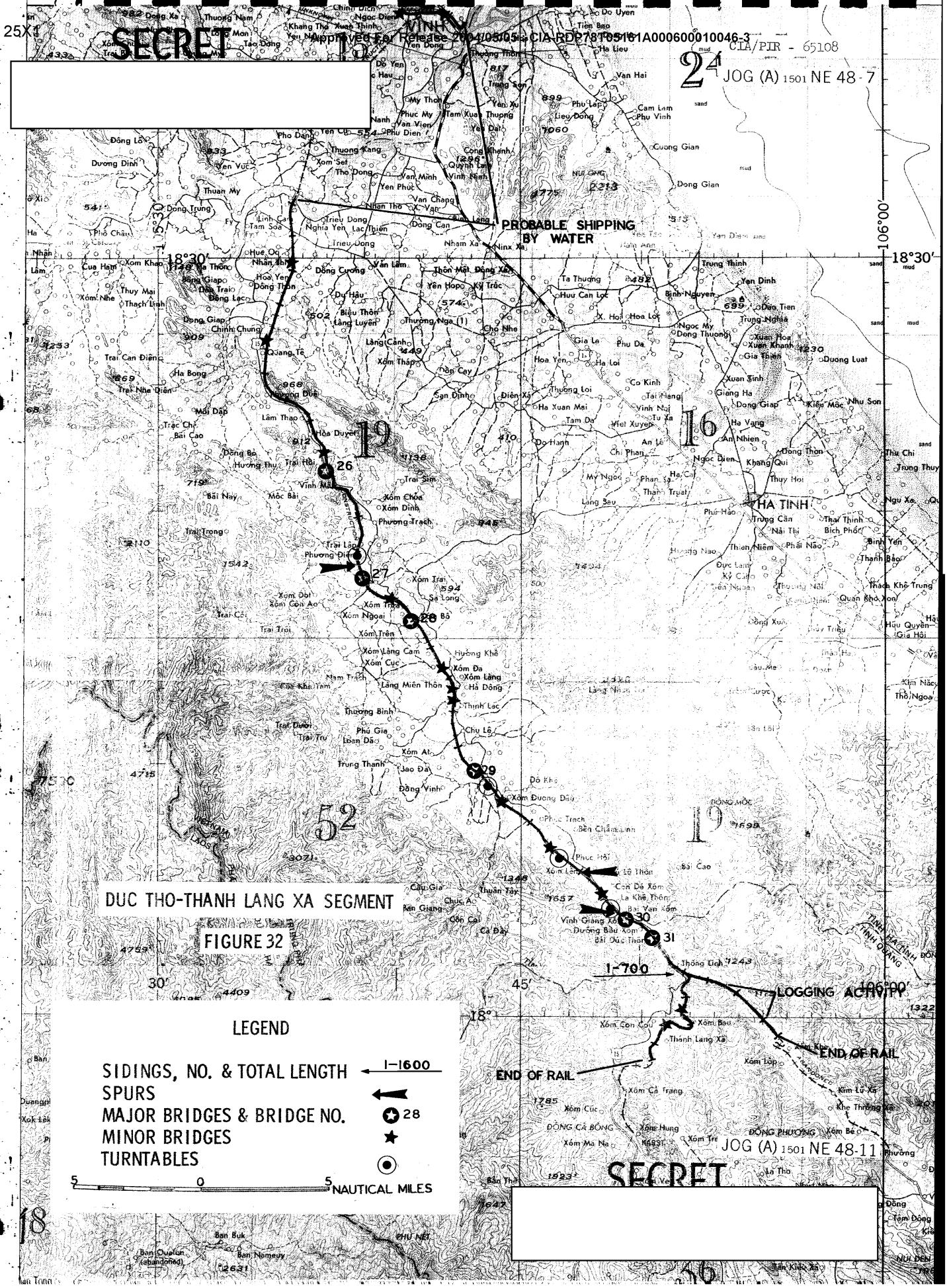
The following map (Figure 32) shows the general alignment, location of bridges, sidings, spurs, and turntables. Figures 33 through 39 with the exception of Figure 38 show the major bridges along this segment and the text accompanying each figure describes significant details. Figures 38 and 40 are perspective drawings, compiled from several photographs, of the La Khe Thon railroad bridge and the Bai Duc Thon railroad by-pass bridge.

There are no yards along this segment of the rail line.

There has been constant repair and reconstruction activity on this segment of the rail line since early autumn 1965. However, the reconstructed bridges are built to carry only very light loads. This fact may explain why the North Vietnamese are using cargo trucks adapted to rail movement, for motive power. An acute shortage of locomotives may also be the reason why converted trucks are in use.

Figure 41 is a drawing of a turntable located at 18 06N - 105 46E. This turntable is the only one of four imaged along this segment of the rail line which has a short spur leading away from the main line to a camouflaged shelter. The other three turntables serve only to reverse the direction of converted trucks or rolling stock.

[redacted] 25X



[redacted]

25X

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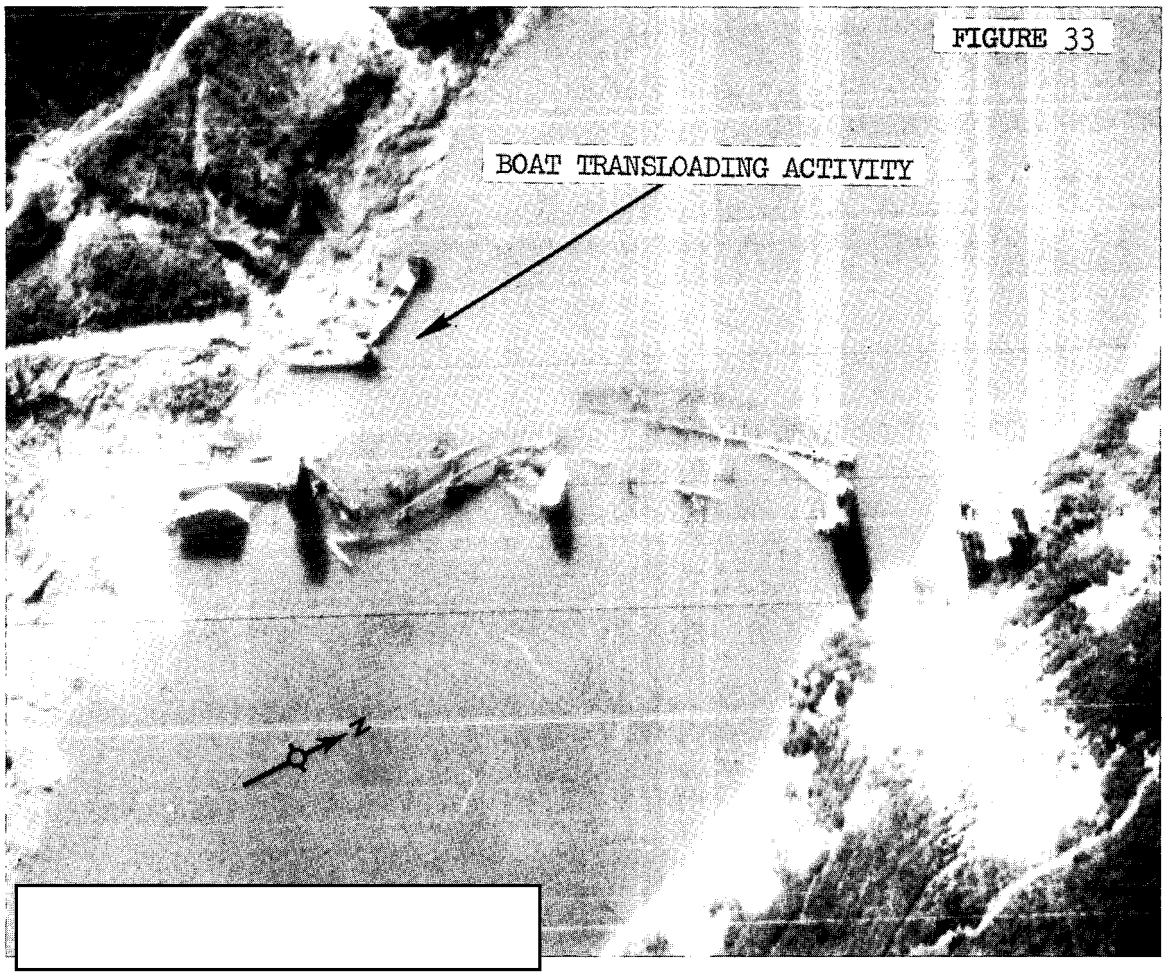


[redacted]

X1

Bridge Number 26 - Trai Hoi RR and Hwy. Bridge over Ngan Sau

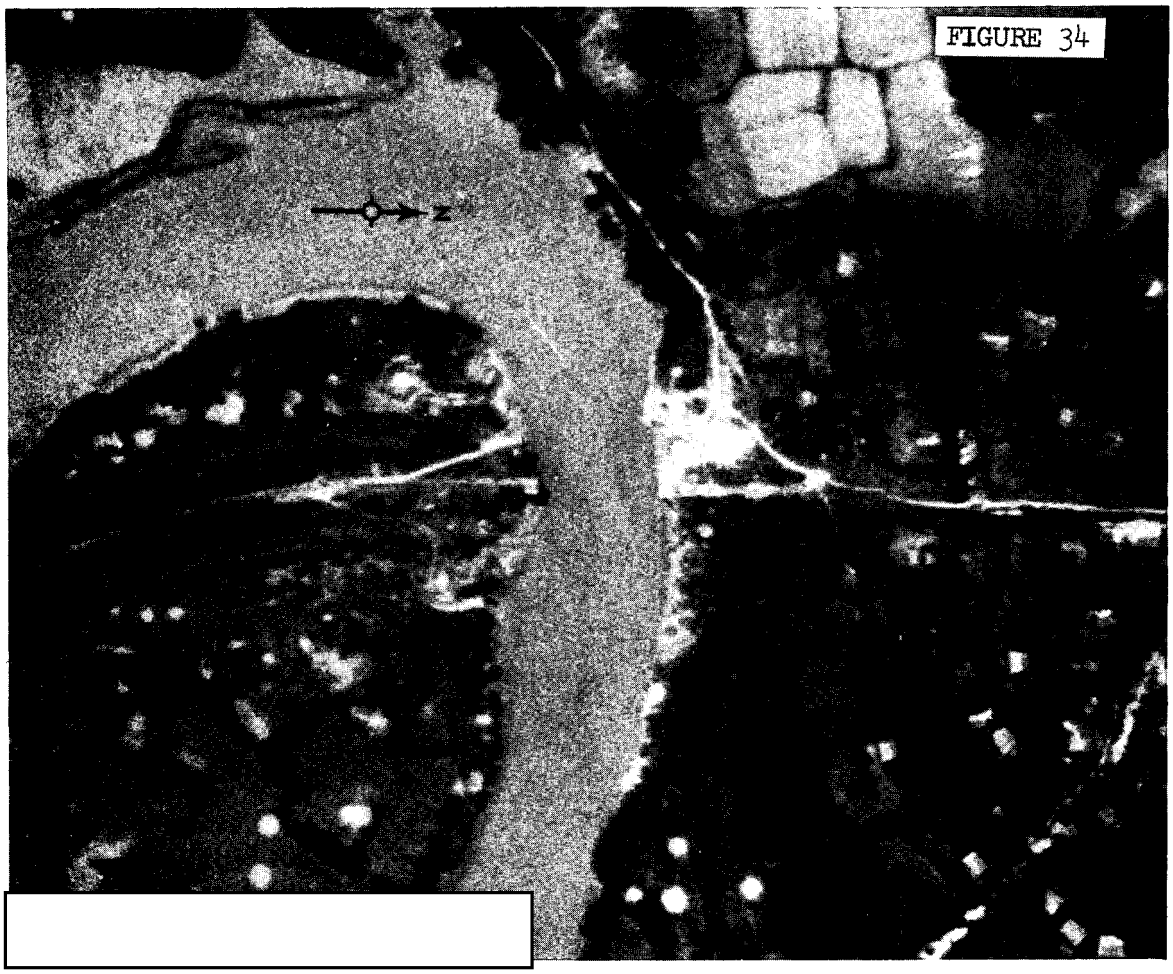
X1 [redacted] (CIA/IAD/BDA Bridge Number 9 on NE 48-7)

This bridge was originally a 4-span, steel and concrete structure approximately 510' long. It had two steel, through-truss spans, one half-through truss span and one concrete deck span. This bridge was completely destroyed by US airstrikes and no attempt has been made to repair the bridge. However, there is a ferry system employing small boats at the site of the destroyed bridge. It appears that trains unload at the ends of the bridge and the material is ferried across the river and then reloaded on a waiting train.

[redacted]

25X

FIGURE 34



X1

Bridge Number 27 - Phuong Dien RR and Hwy. Bridge over Rao No

X1 CIA/IAD/BDA Bridge Number 10 on NE 48-7)

This bridge was originally a 4-span, steel, deck-girder structure approximately 160' long. The original bridge was completely destroyed by US airstrikes and no reconstruction has been attempted. However, a light movable pontoon bridge has been observed at this site which could be used by porters to transfer material across the river.

[redacted]

25X

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[redacted]

X1

Bridge Number 28 - Xom Bo RR Bridge

CIA/IAD/BDA Bridge Number 87 on NE 48-7

This is a 110', 3-span, steel, deck-girder type bridge. This bridge has not been bombed.

[redacted]

25X

[redacted]

25X

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X1 [redacted]

Bridge Number 29 - Dong Bai RR Bridge over Song Tiem

X1 [redacted] (CIA/IAD/BDA Bridge Number 11 on NE 48-7)

This bridge originally was an approximately 215', 12 to 15 span, timber, trestle bridge. Since it was destroyed by US airstrikes in February 1966, a replacement bridge of the same timber trestle type is under construction. Another probable timber trestle bridge and rail approaches are under construction nearby.

[redacted]

25X

X1

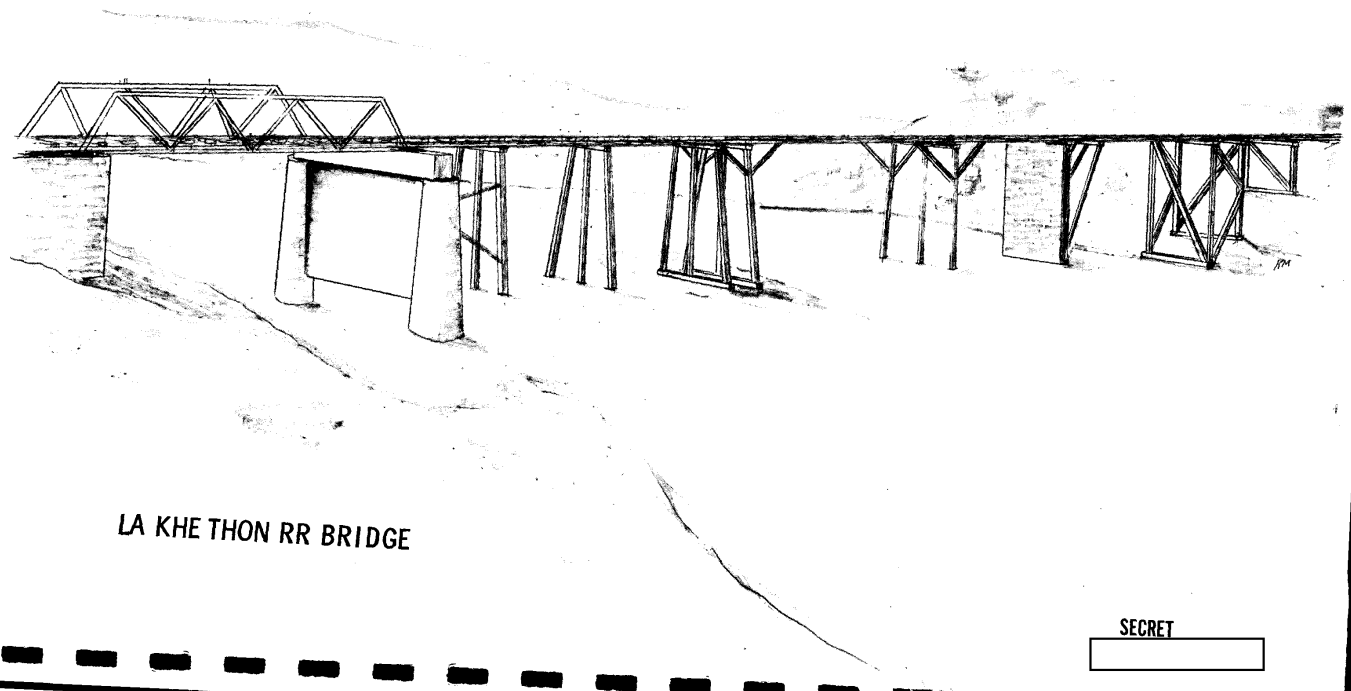
Bridge Number 30 - La Khe Thon RR Bridge over Ngan Sau

X1 CIA/IAD/BDA Bridge Number 13 on NE 48-7)

This bridge was originally a combination, wood and steel deck beam and half-through truss structure approximately 350' long. It was heavily damaged by US airstrikes in April 1965. Since then the bridge has been reinstated by building a wooden, trestle-type structure at the original bridge site (See figure 38). The capacity of the wooden bridge is approximately 7-10 tons per span total load.

SECRET

CIA/PIR - 65108
FIGURE 38



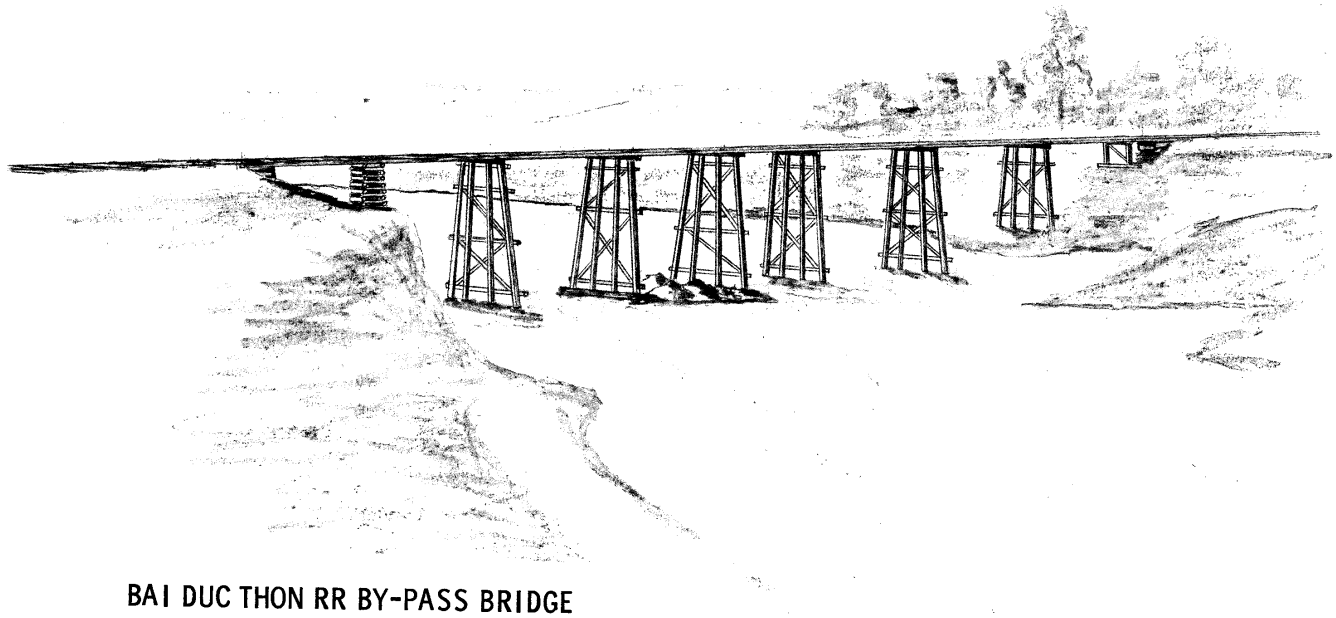
LA KHE THON RR BRIDGE

SECRET

Bridge Number 31 - Bai Duc Thon RR Bridge over Khe Ba Giang

(CIA/IAD/BDA Bridge Number 7 on NE 48-7)

This was originally a single-span, steel, through truss bridge with masonry abutments. US airstrikes dropped the span, and a wooden trestle-type bridge was reconstructed over the wreckage of the old bridge. The replacement bridge was destroyed by US airstrikes in February 1966. Since that time a timber trestle bypass bridge and rail approaches have been constructed about 100 yards west of the bridge (See figure 40). This bypass is now serviceable. The maximum safe load per span is approximately 10 tons.

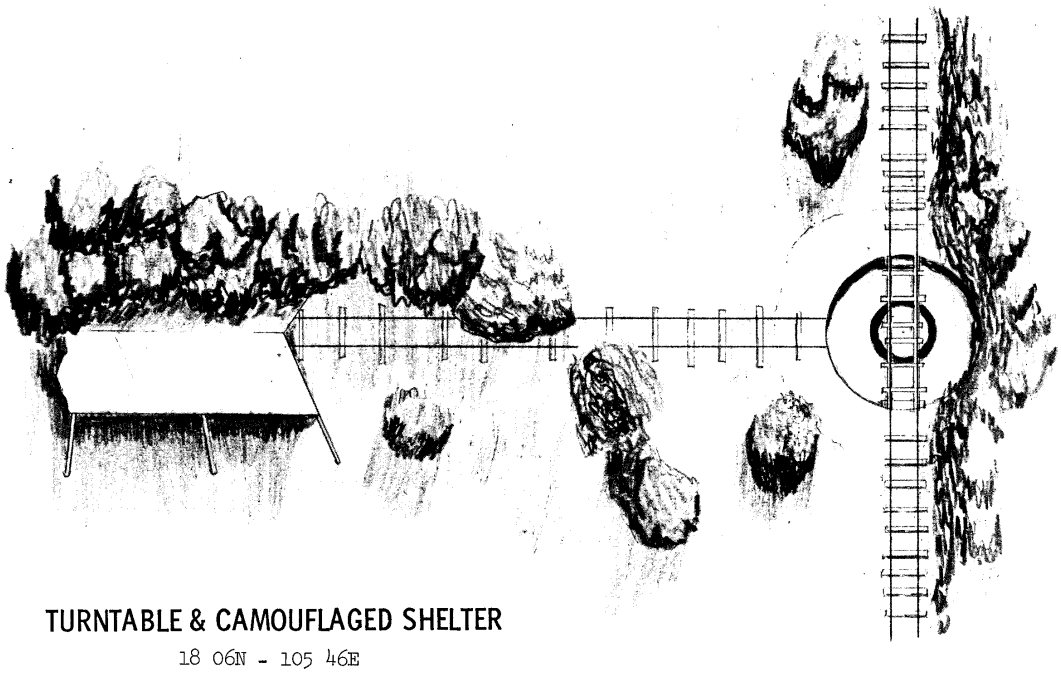


BAI DUC THON RR BY-PASS BRIDGE

SECRET

CIA/PIR - 65108

FIGURE 41



TURNTABLE & CAMOUFLAGED SHELTER

18 06N - 105 46E

SECRET

X1

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REFERENCES

25X

MAPS AND CHARTS

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1st Ed. Nov. 1965 (UNCLASSIFIED)

JOG (A) Series 1501 NE 48-3 Thanh Hoa, Vietnam, Scale 1:250,000
1st Ed. Nov. 1965 (UNCLASSIFIED)

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1st Ed. Nov. 1965 (UNCLASSIFIED)

JOG (A) Series 1501 NE 48-11 Ba Don, Vietnam, Scale 1:250,000
1st Ed. Nov. 1965 (UNCLASSIFIED)

X1

X1

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2. Bureau Commissaire Des C.F.V.N. - Saigon, Ligne de Hanoi a Saigon, Profil en Long (Date unknown) (UNCLASSIFIED)

3. SAF Forestry Handbook, Section 18 Forest Road Engineering 1961, (UNCLASSIFIED)

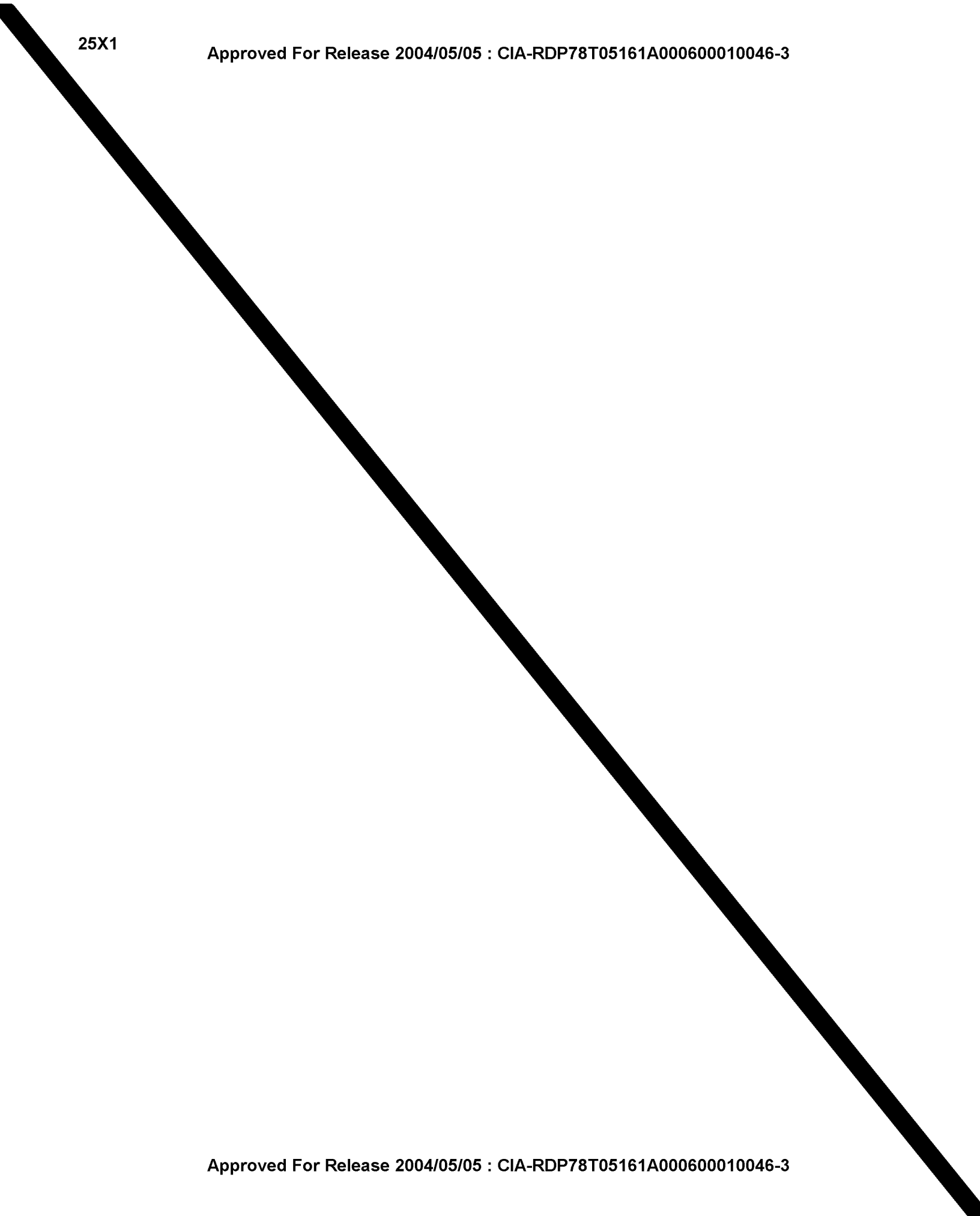
REQUIREMENT

C-CI6-83,298

CIA/IAD PROJECT

30753-6

X1



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